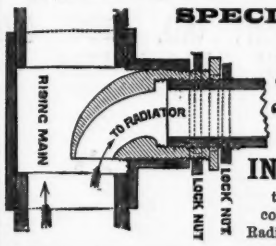
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXX. No. 1789.] LONDON, AUGUST 24, 1897. [49TH YEAR. PRICE 6d.

TUBES AND FITTINGS
FOR
GAS, STEAM, WATER,
AND ALL PURPOSES,
ALSO
COILS OF EVERY SIZE AND SHAPE.

Apply to the Original Firm of
JOHN BROTHERTON
LIMITED,
Imperial Tube Works, Monmore Green,
WOLVERHAMPTON.
ESTABLISHED 1861.

GAS CONSUMERS'
REQUIREMENTS.
TUBES, COCKS, UNIONS, BRACKETS, PENDANTS, LANTERNS, CHANDELIERS, AND GENERAL FITTINGS.
MANUFACTURED BY
VAUGHAN & BROWN, LTD.,
15, 16, 17, Kirby Street, London, E.C.



SPECIALITE
FOR
HOT-WATER
CIRCULATION.
'ACME'
PATENT
INJECTOR,
to be fixed in connection with Radiators on Mains.

— ESTABLISHED 1830. —
PARKER & LESTER,
Manufacturers & Contractors.
THE ONLY MAKERS
PATENT ANTIMONY PAINT,
Parker's Imperial Black Varnish,
Oxide Paints, Oils, and General Stores, for Gas and Water Works.
WORKS:
ORMSIDE STREET, OLD KENT ROAD,
LONDON.

'BEAR CREEK' CANNEL
LOG MOUNTAIN COAL, COKE, AND TIMBER CO
PINEVILLE, KENTUCKY, U.S.A.
Cable Address:
"HULL, PINEVILLE." Codes used "ABC" & "A1."
Communications to the Company only.

NORTON'S PATENT
"ABYSSINIAN" & ARTESIAN TUBE WELLS,
FOR TOWN WATER-WORKS AND OTHER SUPPLIES.
The following Town Water-Works Supplies have been obtained by this System, viz.:—Abbott's Langley, Aldershot, Alnwick, Cirencester, Hertford, Lechlade, St. Albans, Shrewsbury, Skegness, Southampton, Stony Stratford, Swansea, Wallingford, Watford, West Worthing, Wimborne, &c.
LE GRAND & SUTCLIFF,
HYDRAULIC ENGINEERS, 100, BUNHILL ROW, LONDON, E.C.

ECONOMY IN FUEL.

The CAMBRIDGE ELECTRIC SUPPLY CO., Ltd.,
Thompson's Lane, Cambridge,
May 5th, 1897.

Messrs. MELDRUM BROS., MANCHESTER.

YOUR FURNACES.

Dear Sirs,
At the end of the month's trial, April 30, you will be glad to hear that your furnace has fulfilled the guarantee: the amount per unit generated in coal has been reduced by 17½ per cent., and per unit sold 30 per cent. The absence of smoke is very marked, excepting a slight amount when the boiler has been forced hard. We have on several occasions obtained an evaporation of over 8000 lbs. per hour (boiler being two-flue Lancs., 30 ft. by 7 ft. 6 in.). There is little doubt that the Board at their next meeting will decide to add these furnaces to the two remaining boilers. (Signed) *JOHN H. BARKER.*

NOTE.—Since the above letter was written, we have received the order for the two remaining boilers.

MORE STEAM.
LESS COST.
LESS SMOKE.

5000
WORKING.

Write for Catalogue and other Testimonials.

MELDRUM BROS.,
Atlantic Works, MANCHESTER,
ALSO AT
London, Liverpool, Leeds, Birmingham, Glasgow, Newcastle-on-Tyne, Paris, New York, Bombay, Calcutta, Tokio, Sydney.

DANIEL HOWARD,

(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER & BOILER WORKS,

WEST BROMWICH, NEAR BIRMINGHAM

(ESTABLISHED 1765),

MANUFACTURER OF TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST IRON TANKS FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, and all kinds of GAS APPARATUS,

Wrought-Iron Roofs, Bridges, Girders, &c.,

Steam, Hot Water, and Range Boilers, Tanks, Cisterns, Boats, and all kinds of Wrought-Iron Work.

DRAWINGS, SPECIFICATIONS, AND ESTIMATES SUPPLIED ON APPLICATION.

EDWARD COCKEY & SONS, LIMITED,

ENGINEERS & CONTRACTORS FOR GAS-WORKS,

MAKERS OF FISH AND SMITH'S PATENT (NO. 5108) OVERFLOWS FOR REGULATING THE SEAL IN GAS-WASHERS, &c.

TELEGRAPHIC ADDRESS: "COCKEYS FROME."

Improved Dry-Faced Centre Valves for Working either One, Two, Three, or Four Purifiers at one time; giving an increase of Purifying Area above that obtainable with ordinary Centre Valves of 33⅓ per Cent.

PRICES ON APPLICATION TO THE SOLE MAKERS.

THE IRON-WORKS, FROME SELWOOD, SOMERSET.

London Office: BRIDGE HOUSE, 181, QUEEN VICTORIA STREET, E.C. *BALE AND HARDY, Agents.*

HIGHEST AWARDS—LONDON, PARIS, COLOGNE, VIENNA, MELBOURNE, AND OTHERS.

—11 MEDALS.—

MANUFACTURERS OF TUBES AND FITTINGS OF EVERY DESCRIPTION.

WROUGHT-IRON OR STEEL MAINS UP TO 6 FEET DIAMETER, FOR GAS, WATER, OIL, OR OTHER PURPOSES.

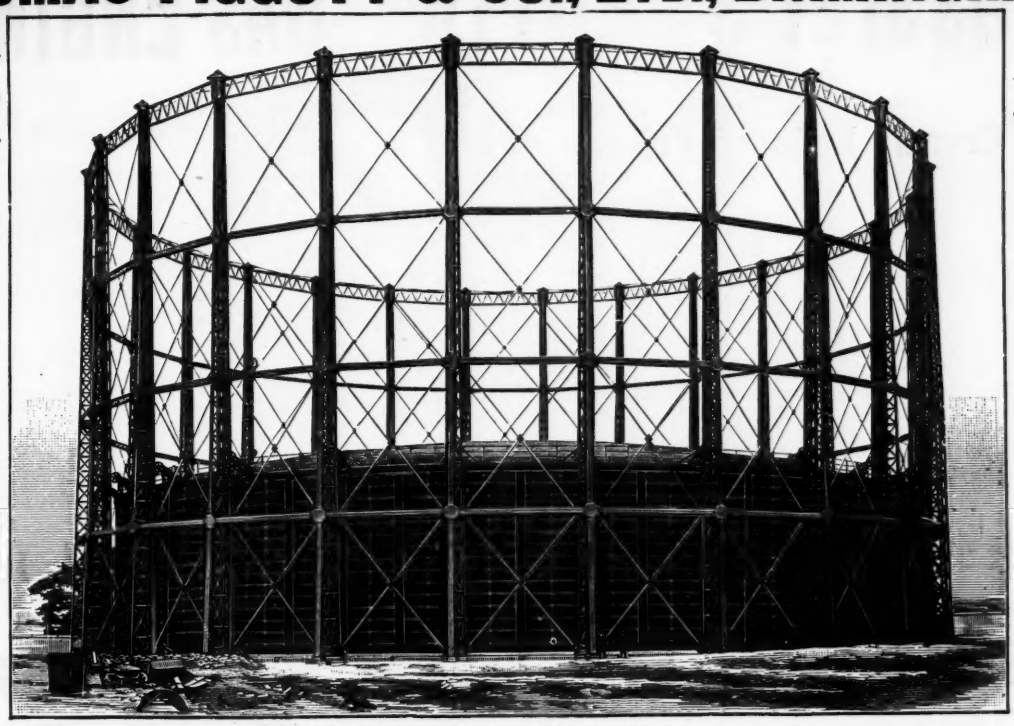
SCREWING TACKLE, BOILER MOUNTINGS, VALVES, COCKS, ETC.

LONDON: 108, Southwark Street, MANCHESTER: 33, King Street West. BIRMINGHAM: 114, Colmore Row. LEEDS: 6, Mark Lane, New Briggate.

THOMAS PIGGOTT & CO., LTD., BIRMINGHAM.

LONDON OFFICE: ST. THOMAS APOSTLE, E.C.

GAS PLANTS, BOILERS, ENGINES, PUMPS, ROOFS, RETORT FITTINGS, ETC.



TELEGRAPHIC ADDRESS: ATLAS BIRMINGHAM

WELDED & RIVETED PIPES, FOUL MAINS, RETORT LIDS, WROT & CAST TANKS, PURIFIERS.

MANUFACTURERS OF

HUMPHREYS & GLASGOW'S

PATENT CARBURETTED WATER-GAS PLANT.

INSTALLATIONS HAVE ALREADY BEEN SUPPLIED, AND ARE IN HAND FOR THE FOLLOWING GAS-WORKS: COPENHAGEN, BELFAST, GLASGOW, BRUSSELS, SANTIAGO, SWANSEA, TOTTENHAM, LIVERPOOL, BRIGHTON, BATH, PRESTON, SOUTHPORT, NEW YORK, NEWBURGH (N.Y.), NEWBURGH (SECOND CONTRACT), HOYLAKE, BELFAST (SECOND CONTRACT), EDINBURGH, TOTTENHAM (SECOND CONTRACT), WINCHESTER, MANCHESTER, BRUSSELS (SECOND CONTRACT), ST. JOSEPH (MO.), HOLYOKE (MASS.), SHANGHAI, STOCKTON, STOCKPORT, NORWICH, GUILDFORD, SYRACUSE, BORDENTOWN, LEA BRIDGE, COVENTRY, COMMERCIAL, BRENTFORD, BRIDLINGTON, MIDDLESBROUGH, CROYDON, L. & N.W. RY. CREWE, NINE ELMS, BROMLEY, COVENTRY (SECOND CONTRACT), TAUNTON, ROTTERDAM, DORKING, LEA BRIDGE (SECOND CONTRACT).

JOSEPH EVANS & SONS, CULWELL WORKS, WOLVERHAMPTON.

Telegrams: "EVANS WOLVERHAMPTON." PLEASE APPLY FOR CATALOGUE No. 8. National Telephone No. 7039.

12,000 PUMPS IN STOCK AND PROGRESS.

TRADE MARK.

LION EVANS WOLVERHAMPTON

NO TAPPETS.

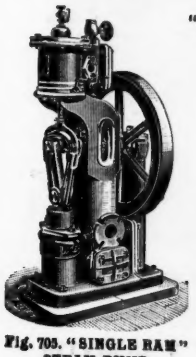


Fig. 705. "SINGLE RAM" STEAM-PUMP.

Fig. 508. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c

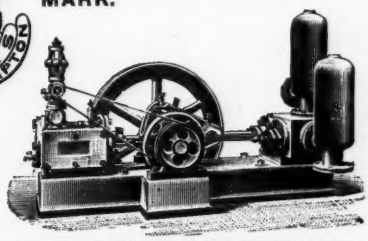


Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

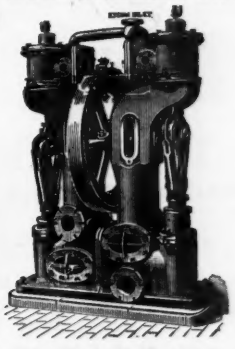
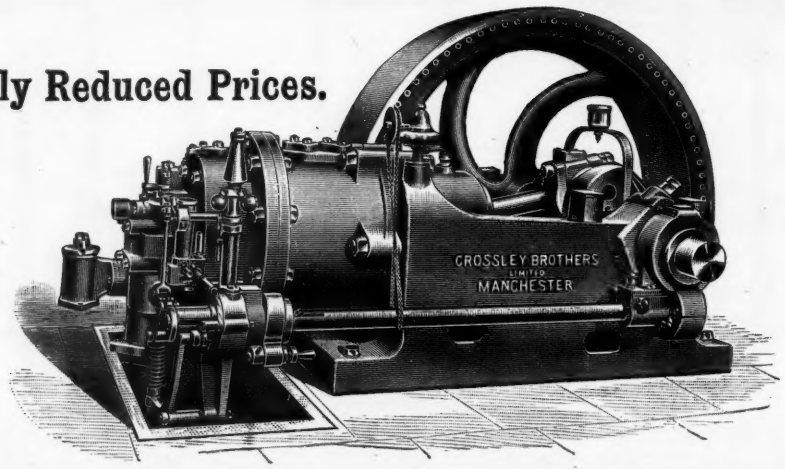


Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

CROSSLEY'S "OTTO" GAS-ENGINES

Greatly Reduced Prices.



REPRESENTS NEW TYPE 40-HORSE POWER NOMINAL HIGH-SPEED ELECTRIC-LIGHT ENGINE.

CROSSLEY BROS., LTD., OPENSHAW, MANCHESTER.

G. & J. HAIGH,

Raven's Lodge Fire-Brick Works, DEWSBURY.

FIRE-BRICKS of the highest Quality, made from Fire-Clay of a most Superior and Refractory Character, suitable for GLASS-WORKS, GAS-WORKS, and BLAST-FURNACES.

WHITE GLAZED AND SALT GLAZED BRICKS, BUFF FACING BRICKS, &c.

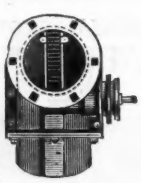
For Prices and Analysis, apply as above.

NEWTON, CHAMBERS, & CO., LIMITED,

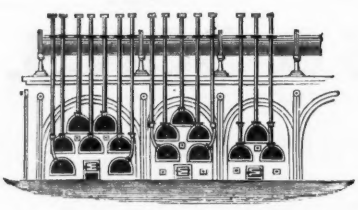
THORNCLIFFE IRON-WORKS, near SHEFFIELD,

MANUFACTURERS OF

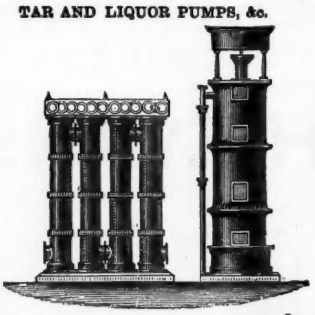
SLIDE VALVES,
WITH RACK & PINION
OR
Internal or External
SCREWS of all sizes.
GASHOLDERS,
AND
Gasholder Tanks.



CAST-IRON RETORTS,
RETORT-BED FITTINGS,
And Retort-House Appliances
of every description,
Iron Roofs, Columns, Girders, Floor Plates,
Tools, &c.

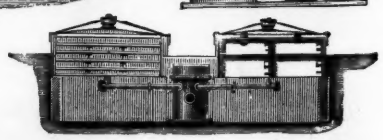


WROUGHT AND CAST IRON
CONDENSERS,
SCRUBBERS, & WASHERS,
TAR AND LIQUOR PUMPS, &c.



PATENT
CENTRE-VALVES
for working Purifiers,
Also Bye-Pass & Stop Valves

PURIFIERS with Planed Joints,
HAND and HYDRAULIC LIFTING GEAR, CAST-IRON MAINS, and SPECIALS.
WOOD GRIDS.
CAST AND WROUGHT IRON TANKS AND CISTERNS.



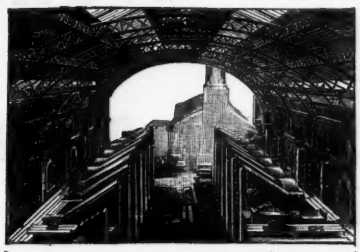
DESIGNS, SPECIFICATIONS, AND ESTIMATES FREE.

Pig Iron (*Special Quality*) for ENGINE CYLINDERS, &c.

GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

W. C. HOLMES & CO.

IRONFOUNDERS AND CONTRACTORS.

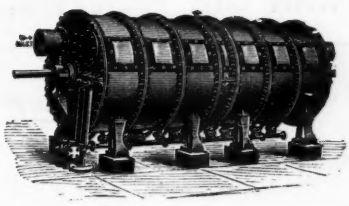


Makers of
GAS & CHEMICAL
PLANT.

Telegrams:
"HOLMES, HUDDERSFIELD."

Improved
PATENT SCRUBBER-WASHERS,
All sizes,
From 50,000 to 5,000,000 Cubic Feet of Gas per day.
Results unrivalled. Send for Particulars and Prices.

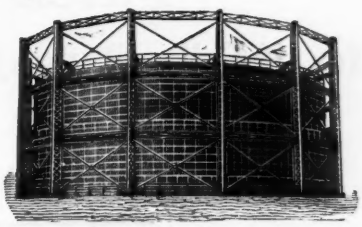
MALLEABLE
and all Kinds of
CASTINGS.



GASHOLDERS of Improved Construction and of all Sizes.
ROOFS, BRIDGES, TANKS, GIRDERS.

Improved
BYE-PASS and
CENTRE-VALVES,
GOVERNORS,
and METERS.

Rotary or Pump
EXHAUSTERS.



80, CANNON STREET, LONDON,
AND
WHITESTONE IRON WORKS, HUDDERSFIELD.

THE
MAXIM PATENT CARBURETTOR

FOR ENRICHING GAS IN BULK.

Over 50 Maxim Patent Carburettors have now been fixed, capable of enriching

650,000,000

CUBIC FEET OF GAS PER DAY.

Among the Companies supplied are The Gaslight and Coke Company, the South Metropolitan Gas Company, Birmingham Corporation, Manchester Corporation, Rochdale Corporation, Bristol Gas Company, and many other Works, both large and small, where they have been working in some instances for the past **FOUR YEARS.**

More Gas and saleable Coke per ton of Coal Carbonized is produced; saving Capital Labour, Fuel, Wear and Tear, &c.

The Enrichment is **INSTANTANEOUS** and **PERMANENT.**

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

SOLE AGENTS FOR REDWOOD & CLOWES' INFLAMMABLE VAPOUR & GAS DETECTORS.

Dealers in Carburine and all other Naphthas for the Enrichment of Gas.

FOR PRICES AND FULL PARTICULARS, APPLY TO

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,
18, DEVONSHIRE STREET, BISHOPSGATE, LONDON, E.C.

INCANDESCENT GAS-LIGHT

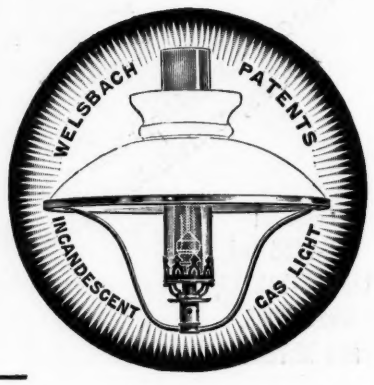
(WELSBACH PATENTS).

THE GREATLY REDUCED CONSUMPTION OF GAS COVERS THE INITIAL COST OF THE BURNER IN LESS THAN SIX MONTHS.

The Ordinary "C" Burner,
PRICE 6/6.

The "C" Bye-Pass Burner,
PRICE 7/6.

Prices of other Patterns Reduced Proportionately.



The attention of **Gas Managers and Gas Engineers** is called to this System of Lighting as one which tends to **Popularize the Use of Gas** as an Illuminant, owing to the following Advantages :—

Economy in Consumption of Gas, combined with High Illuminating Efficiency.
Freedom from Smoke, Dirt, and Flickering.
Greatly Reduced Heat.
The combination of High Lighting Power with DURABILITY can only be obtained by The Welsbach System.

The "Lancet" Special Analytical and Sanitary Commission, in an exhaustive report, pronounces the "Incandescent Gas-Light System" to be the **Healthiest, Best, and most Economical System of Gas Lighting.**

Suitable for every purpose of **Inside and Outside Lighting.**

Avoid the WORTHLESS IMITATIONS now being offered by UNSCRUPULOUS INFRINGERS.

OVER ONE HUNDRED AND FIFTY JUDGMENTS

and Interim Injunctions recently obtained against Companies, Firms, and Persons INFRINGING THE "WELSBACH" PATENTS, or INFRINGING THE LIMITED LICENSE under which the Mantles are sold.

FOR FURTHER PARTICULARS, APPLY TO

THE INCANDESCENT GAS-LIGHT COMPANY, Ltd.,
PALMER STREET, WESTMINSTER, LONDON, S.W.

THE "TRAFALGAR"
PREPAYMENT GAS-METER
FOR PENCE, SHILLINGS, OR ANY COINAGE.

THE ADVANTAGES OF THIS SYSTEM ARE:

1. Simplicity of Mechanism.
2. Absolute Accuracy.
3. Impossibility of being tampered with.
4. Unaffected by irregularities in shape or thickness of the penny.
5. Can be fixed to any ordinary Wet or Dry Meter.
6. Extra large Money-Box.
7. Price Changer can be altered without otherwise disturbing the Meter.
8. Index showing number of pennies in the mechanism at any time.
9. Rejection of half-pennies certain.

GUARANTEED FOR FIVE YEARS.

FRANK WRIGHT'S PREPAYMENT GAS-METER CORPORATION, Limited,

Telegraphic Address: "Gasometer, London." Manufacturers of Wet and Dry Gas-Meters. Offices and Works: 62, GLENGALL ROAD, S.E. Telephone No. 59, Peckham.

TELEGRAMS: "FIRECLAY," LEEDS.
TELEPHONE No. 612.

BRANDS: CLIFFS', INGHAMS', BROOKES'.

The Leeds Fireclay Co. Ltd
WORTLEY, LEEDS.
ENGINEERING DEPARTMENT.

CONTRACTORS for
BUILDINGS, ROOFS,
RETORT SETTINGS & IRONWORK
COAL AND COKE
BREAKING, ELEVATING, CONVEYING,
AND STORAGE PLANT.
RE-SETTING EXISTING RETORTS.
RETORT HOUSE WORK GENERALLY

MANUFACTURERS of
HORIZONTAL & INCLINED
MACHINE AND HAND-MADE
RETORTS,
BRICKS, BLOCKS, TILES, &c.

GIBBONS BROTHERS, LIMITED,

Telegraphic Address: "GIBBONS, DUDLEY."

DUDLEY,

Telephone No. 8013.

GAS ENGINEERS, CONTRACTORS, RETORT SETTERS.

Patent REGENERATIVE SETTINGS,

GIBBONS & MASTERS' PATENT No. 1269, 1893.

SUITABLE FOR WORKS OF EVERY CAPACITY,

AND A SPECIAL FORM OF WHICH IS APPLICABLE TO

GASEOUS FIRING WITH A MINIMUM EXCAVATION.

RETORT-BENCH IRONWORK, CONDENSERS,

SCRUBBERS, PURIFIERS, VALVES, &c.

DESIGNS AND ESTIMATES ON APPLICATION.

S. CUTLER AND SONS, MILLWALL, LONDON.

CARBURETTED WATER-GAS PLANT.

(CUTLER'S PATENTS)

ADOPTED AT HORNSEY, HASTINGS, SOUTHEND,

PLYMOUTH, BUENOS AYRES, SOUTHALL (BRENTFORD GAS COMPANY).

GASHOLDERS

OF EVERY SIZE AND DESCRIPTION.

CUTLER'S PATENT GUIDE-FRAMING FOR GASHOLDERS

HAS BEEN ADOPTED FOR MANY IMPORTANT HOLDERS.

IT IS STRONG AND CHEAP, AND REQUIRES NO PIERS FOR ITS SUPPORT.

SUNLIGHT INCANDESCENT GAS-BURNERS.

IN CONSEQUENCE OF MISREPRESENTATIONS WHICH HAVE BEEN CIRCULATED RESPECTING THE SUNLIGHT MANTLES, THE FOLLOWING CERTIFICATE IS NOW GIVEN WITH EVERY MANTLE:—

"The New Incandescent (Sunlight Patent) Gas Lighting Company, Limited, hereby certify that the within Mantle is in every respect similar in process of Manufacture and constituent parts or substances to the Mantle which was held by the Hon. Mr. Justice Wills **NOT TO BE AN INFRINGEMENT OF THE WELSBACH PATENTS."**

AND WE FURTHER CALL ATTENTION TO THE EXTRACTS FROM THE JUDGMENT GIVEN BY THE HON. MR. JUSTICE WILLS, WHEN HE DISMISSED THE WELSBACH COMPANY'S APPLICATION FOR INJUNCTION:—

"No use is made by the Sunlight Company of any of the rare earths; and their choice of substances, and their method of applying the illuminants, appear to me to be **as wide asunder as the Poles** from those contemplated by Welsbach."

"Welsbach Company's Counsel both admit that they have no case unless the Welsbach skeleton, of whatever resistant earth oxides composed, is within the Welsbach Patent. It seems to me that **this is just what Welsbach did not claim."**

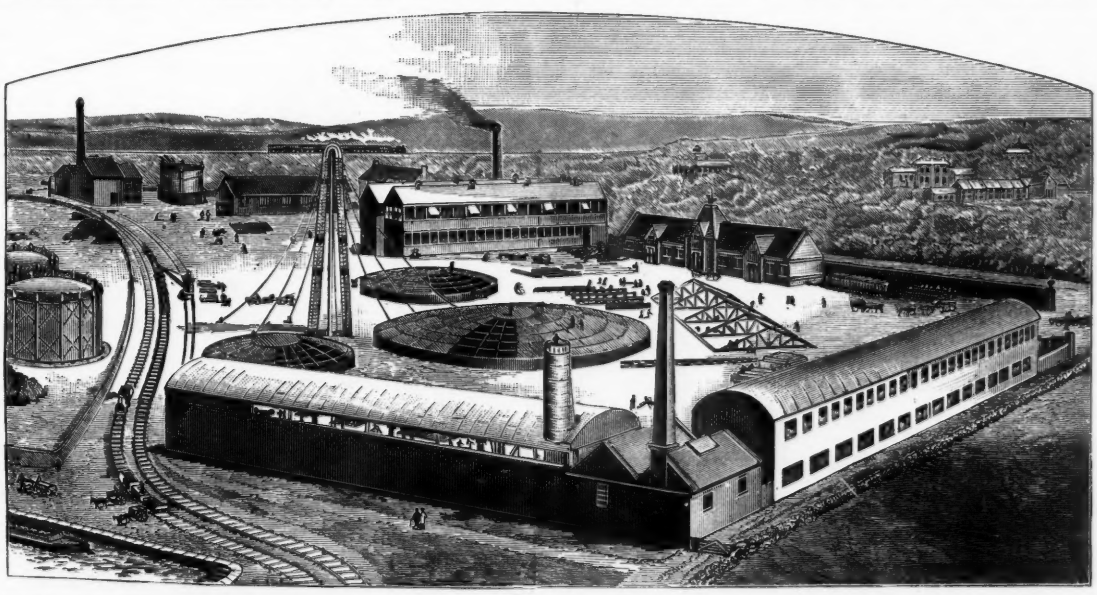
PRICE LIST AND TERMS ON APPLICATION.

THE NEW INCANDESCENT (SUNLIGHT PATENT) GAS LIGHTING Co., LIMITED.

33 & 34, Shoe Lane, London, E.C.

WILLEY & CO., GAS ENGINEERS.

OFFICES: EXETER. WORKS: 248, Kingsland Road, LONDON; James St., and St. Thomas, EXETER.



MANUFACTURERS OF WATER-GAS PLANT, GASHOLDERS, GAS-FITTINGS, GAS APPARATUS, WET AND DRY CONSUMERS' METERS, AUTOMATIC METERS—PENNY-IN-THE-SLOT.

CONTRACTORS TO THE GOVERNMENT.

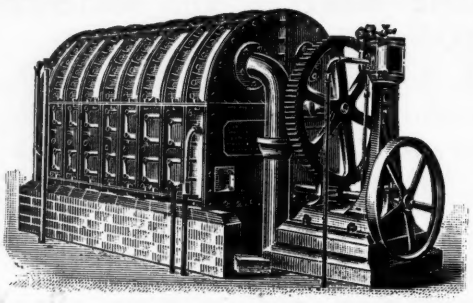
Telephone 132. **Telegraphic Address: "WILLEY, EXETER."**

KIRKHAM, HULETT, & CHANDLER, Ld.

3 & 4, PALACE CHAMBERS, BRIDGE STREET, WESTMINSTER, S.W.

PATENT "STANDARD" WASHER-SCRUBBER.

This Apparatus upholds its title, the "STANDARD;" being recognized by leading Engineers as the most efficient Apparatus for the Extraction of Ammonia from Coal or other Gases.



The Largest Order ever given for WASHER-SCRUBBERS was recently received being for **16** Patent "Standard" Washer-Scrubbers, each for 3,500,000 Cubic Feet of Gas per day.

Number of Patent "STANDARD" Washer-Scrubbers in use at this date

540

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

Midland District Office: PRINCE'S CHAMBERS, 6, CORPORATION STREET, BIRMINGHAM—Sole Agent: A. C. SCRIVENER.

TELEGRAPHIC ADDRESS: "WIGAN BIRMINGHAM." TELEPHONE No. 200.

London District Office: 6, STRAND, LONDON—C. PARKER & SON, Sole Agents.

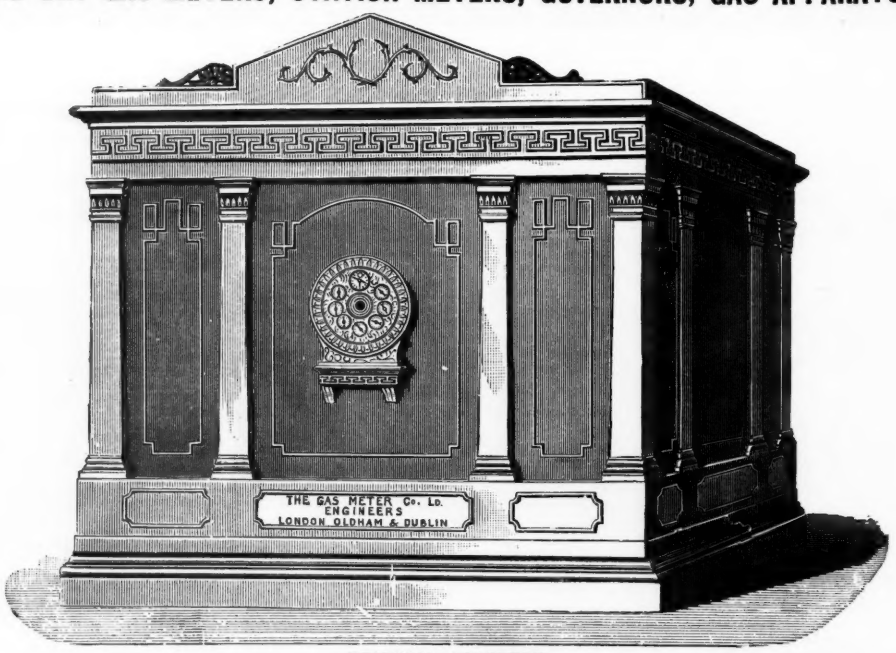
TELEGRAPHIC ADDRESS: "PARKER LONDON."

THE GAS-METER COMPANY, LIMITED

MANUFACTURERS OF

WET AND DRY GAS-METERS, STATION METERS, GOVERNORS, GAS APPARATUS, ETC.

SQUARE STATION METERS WITH PLANED JOINTS.



STATION METERS IN CYLINDRICAL CASES.

DESIGN No. 2 PATTERN.

STATION METERS MADE AT THE COMPANY'S WORKS, OLDHAM, LATE WEST & GREGSON. Established 1830.

For Prices and Particulars apply to

R. L. ANDREWS, General Manager.

Works: 238, KINGSLAND ROAD LONDON; UNION STREET, OLDHAM; HANOVER STREET, DUBLIN.

Telegraphic Address: "METER."

See Advertisement on back of Wrapper.

ALEX. C. HUMPHREYS, M.Inst.C.E. A. G. GLASGOW, M.E.

SINCE 1893

MESSRS. HUMPHREYS & GLASGOW

Have constructed or have in hand

CARBURETTED WATER-GAS PLANT

FOR THE FOLLOWING UNDERTAKINGS:—

	Cub. Ft. Daily.		Cub. Ft. Daily.
Copenhagen	700,000	Norwich	1,000,000
Belfast	1,700,000	Winchester	200,000
Belfast (Second Contract)	4,500,000	Holyoke, Mass.	600,000
Glasgow	300,000	Hoylake	125,000
Brussels	700,000	Shanghai	225,000
Brussels (Second Contract)	700,000	Stockport	500,000
Liverpool	3,500,000	St. Joseph, Mo.	750,000
Tottenham	750,000	Lea Bridge	350,000
Tottenham (Second Contract)	750,000	Lea Bridge (Second Contract)	350,000
Santiago	400,000	Guildford	350,000
Swansea	750,000	Stockton-on-Tees	500,000
Manchester	3,000,000	Syracuse, N.Y.	850,000
Brighton	1,750,000	Brentford	1,200,000
Preston	1,500,000	Commercial Gas Co.	850,000
New York	1,200,000	Commercial Gas Co. (Second Contract)	850,000
Southport	750,000	Bridlington	125,000
Bath	1,000,000	Middlesbrough	1,250,000
Newburgh, N.Y.	350,000	Croydon	1,250,000
Newburgh, N.Y. (Second Contract)	250,000	L. & N.W. Railway, Crewe	700,000
Edinburgh	2,000,000	Taunton	225,000
Coventry	600,000	Rotterdam	850,000
Coventry (Second Contract)	600,000	Dorking	125,000
Bordentown, N.J.	125,000		

THE GASLIGHT AND COKE CO. { Nine Elms / Bromley } . . . . . 6,250,000 Cubic Feet.

In addition to which the 1891 Installations of The Gaslight and Coke Company, on the Humphreys' Double-Superheater System, have a capacity of 12,000,000 Cubic Feet per diem.

IN THE UNITED STATES,

223 Sets of Humphreys' Double-Superheater Apparatus have been erected by The United Gas Improvement Company alone; **102** of these since **1893**. This Company (of which Mr. A. C. Humphreys was formerly Chief Engineer) was, until lately, the largest Constructor of Carburetted Water-Gas Apparatus in the World.

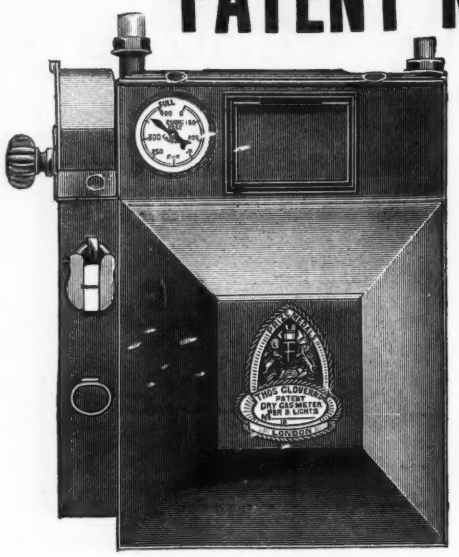
At the present time, Messrs. Humphreys and Glasgow hold that position.

9, VICTORIA STREET, LONDON, S.W.
Telegrams: "EPISTOLARY, LONDON."

UNITED STATES OFFICE:
BANK OF COMMERCE BUILDING, NEW YORK.

THOMAS GLOVER & CO.'S

PATENT NEW IMPROVED PREPAYMENT METER



For Pennies, Shillings, or any Coin.

Simple in Mechanism.
Positive in Results.
Price Changer *in Situ.*

GUARANTEED FOR FIVE YEARS.

Telegraphic Address: "GOTHIC LONDON." Telephone No. 6725.

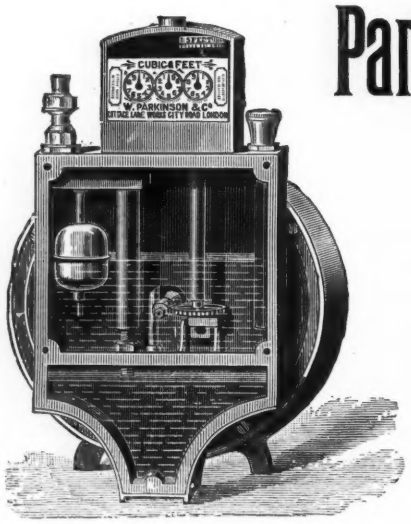
THOMAS GLOVER & CO., LTD.,
DRY GAS-METER MANUFACTURERS,
214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

BRISTOL:	BIRMINGHAM:	MANCHESTER:
28, BATH STREET.	1, OOZELLS STREET.	37, BLACKFRIARS STREET.
Telegraphic Address: "GOTHIC."	*Telegraphic Address: "GOTHIC."*	*Telegraphic Address: "GOTHIC."*

W. PARKINSON & CO.

MANUFACTURERS OF WET & DRY METERS.

OLDEST ESTABLISHED FIRM IN THE TRADE.



Parkinson's Cast-Iron Case Meter.

Works with very little friction.

Will stand very high pressures.

Cannot possibly be shut off by sudden increase of pressure; the float being affected by outlet gas only.

Allows for loss of water by evaporation without materially affecting the registration or shutting off the gas.

Unexcelled for Simplicity of Construction, Excellence of Workmanship, and Accuracy of Registration.

COMPENSATING METERS,

In Tinned or Cast-Iron Cases.

COTTAGE LANE WORKS, CITY ROAD,
LONDON.
Telegraphic Address: "INDEX LONDON."

BELL BARN ROAD WORKS,
BIRMINGHAM.
Telegraphic Address: "GAS-METERS, BIRMINGHAM."

[See also Advt. p. 460.

CONTENTS.

EDITORIAL NOTES:—
GAS, LIGHTING, &c.— PAGE
The Gas Supply of Liverpool . . . 425
The Affairs of the Brentford Company . . . 425
An Extravagant Business at Matlock . . . 426
The Dispute in the Engineering Trade . . . 426
The Meeting of the British Association . . . 426
End of the Penrhyn Quarry Strike . . . 427
ESSAYS, COMMENTARIES, AND REVIEWS:—
Gas and Water Companies in the Stock Market . . . 427
Electric Lighting Memoranda . . . 427
The Annual Meeting of the Society of Chemical Industry . . . 428
The Parliamentary Returns Relating to Gas Undertakings . . . 429
NOTES:—
The Fermentation of Water . . . 431
Scale in Steam-Boilers . . . 431
The Disposal of Towns' Refuse . . . 431
Lighting by Reflection . . . 431
The Light of Fireflies . . . 431
The Efflorescene of Brickwork . . . 431
TECHNICAL RECORD:—
North of Ireland Association of Gas Managers—
A Difference in Hydraulic Mains. By P. Egan, of Tralee . . 432
Description of an Acetylene Gas Plant. By C. B. Outon, of Inchicore . . . 433
British Association of Water-Works Engineers—
Mr. J. Shaw on Distribution . . . 434
Mr. W. C. Finch on Electrical Water-Level Recorders . . . 434
REGISTER OF PATENTS:—
Generation and Storage of Acetylene—Bowers, A. F. . . . 436
Acetylene Gas Generator—Duffield, M. . . . 436
Generating Acetylene Gas—Lake, H. H. (Grenier and Grand) . . 437
Separation of Rare Earths for Use in Incandescent Gas Lighting—Kosmann, B. . . . 437
The Carburetting of Air or Gas—Kremer, G. . . . 437
Production and Treatment of Acetylene—Oving, H. E. . . . 437
Carburetted Water Gas Apparatus—Addicks, W. R. . . . 437
Prepayment Gas Meters—Bromhead, S. S. (F. E. Morgan) . . . 438
Developing Acetylene Gas—Thompson, W. P. (Deutche Acetylen-gas-Gesellschaft mit Beschränkter Haftung) . . . 438
Recovery of Benzols from Gases—Marks, G. C. (La Compagnie pour la Fabrication des Compteurs et Matériels d'Usines à Gaz) 438
Flash Lights for Incandescent Gas Burners—White, C. & T. H. . 438
Gas-Burner—Thompson, W. P. (D. Ferrari) . . . 439
Galleries and Burner Pipes for Incandescent Gas Burners—Wellstein, H. . . . 439
Patent Notices . . . 439
CORRESPONDENCE:—
The Maintainable Profits of Gas Companies . . . 440
Rating . . . 440
MISCELLANEOUS:—
Meeting of the Liverpool United Gas Company . . . 440
Croydon Commercial Gas Company—Half-Yearly Report and Accounts . . . 441
Provincial Gas and Water Companies . . . 441
The South Metropolitan Gas Company's Profit-Sharing Scheme . 442
Glasgow Corporation Gas Supply—The Past Year's Working . . 443
Bingley District Council Gas Undertaking—Good Working Results . . . 443
Leamington Gas-Works Purchase Question—Report by Mr. Thomas Newbigging . . . 444
The Purchase of the Matlock Bath Gas-Works by the District Council—The Cost of the Transfer . . . 445
Electric Lighting Notes . . . 445
Metropolis Water Supply—The Government Bill as Passed . . 445
Notes from Scotland . . . 446
Gas and Water Companies' Stock and Share List . . . 446
Current Sales of Gas Products . . . 448
Coal Trade Reports . . . 449
PARAGRAPHS:—
PERSONAL: Mr. J. W. Tagg; The Late Mr. J. Orwell Phillips; Mr. G. Robinson; Mr. J. Foster; Mr. Corbet Woodall; Dr. A. W. Ward; Mr. Septimus Penny, Assoc.M.Inst.C.E. . . . 430
The Bandsept Burner . . . 427
"Masonry Dams" . . . 428
Issue of Additional Stock by the South Metropolitan Gas Company—Manchester District Institution of Gas Engineers—The Preparation of Improvement Bills—Naphthalene Obstructions of Street-Lamp Taps . . . 430
Electricity *v.* Gas for Lighthouse Illumination . . . 436
Fatal Accident at the Millgate Gas-Works at Stockport . . . 439
Gas and Water Supply in New South Wales—Extensions at the Leeds Gas-Works . . . 440
Sales of Shares—Serious Gas Explosion at a Roman Catholic College—Visit of the Truro Gas Company's Employees to the Plymouth Gas-Works—New Reservoir for Ashford . . . 443
Incandescent Gas Lighting for Richmond . . . 444
The Public Lighting of Aldeburgh . . . 446
Projected Extensions at the Ramsgate Gas-Works—Colney Hatch Gas Company . . . 449

TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

TO ADVERTISERS.

UNDISPLAYED ADVERTISEMENTS—Situations Vacant and Wanted, Apparatus Wanted and for Sale, Contracts, Public Notices, &c.:—

Six Lines and Under (about 42 words) . . . 3s. 0d.
Each Additional Line . . . 0 6

Quotations for Trade Advertisements, Prospectuses of Public Companies, &c., on application to the Publisher.

All communications, remittances, &c., to be addressed to
WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

EDITORIAL NOTES.

The Gas Supply of Liverpool.

THE general public, of which the daily newspaper claims to be the voice, seems to be unable to assimilate the fact that the introduction and development of electric lighting has not had any very noticeable effect upon the fortunes of the gas industry, except perhaps to improve its prospects. In London the newspapers do not notice such trifling matters as the mutual influence of gas and electricity supply, being much more concerned with topics of international moment, such as princely duels, and so forth. Liverpool, however, is sensible enough to have a public opinion of its own, relating to its own local interests; and in this opinion gas and electricity supply are no small concerns. The annual meeting of the Liverpool United Gaslight Company was held on Tuesday last, under the presidency of Mr. Edward Lawrence, Chairman of the Company, who was able to state that the increase in the gas consumption of the city during the past year was the largest on record. The last reduction of price, from 2s. 10d. to 2s. 9d., has been more than recouped by the larger sale. Coal has cost the Company less per ton; but, on the other hand, their residuals have had a poor market, according to general experience. Politically speaking, the Company have entered upon quiet times. There is no local gas agitation; the last ignorantly conceived and foolishly executed movement of the kind having died out with the ephemeral reputation of those who originated it. Mr. Lawrence's speech, explaining the Company's circumstances, was a mild effusion. Yet the "Liverpool Courier," commenting upon it, declares that it breathed a "jubilant and come-on-who-dares sort of tone;" the fact being, of course, that the journalistic mind—in this faithfully reflecting that of the "man in the street"—cannot understand why the electric light has not interfered with the business of gas companies. The writer of the article, however, goes on to comment upon the way in which Liverpool was lighted fifty years ago; and, on the whole, he is not unfair to the Gas Company, though he ends with a half-serious assertion that somehow the Company have been made to "toe the line" of late, so that "their "present attitude is all that the most exacting of critics "can reasonably demand." This is simply rubbish. If anybody in Liverpool has been made to "toe the line" in regard to gas matters, it is the Company's critics. Where is the individual who, on the strength of the figures of an exceptional year, took it upon himself to accuse the Directors of habitually paying half as much again for their coal as the state of the market required? Where is the other gentleman who went to the "Letters of Junius" for his invectives against the Company? Where are the semi-retired medical gentlemen who wanted to make out that the Company had a deep-laid plot for reducing the population of certain parts of their district by distributing a poisonous kind of gas which possessed no other recommendations? It looks very much as though the Liverpool public were beginning to recognize the fact, well known in technical circles, that their gas supply is second to none in the kingdom, and superior to most. Whether Liverpool would or would not be better off with 15-candle gas at something like 2s. per 1000 cubic feet, than with 20-candle gas at 2s. 9d. per 1000 cubic feet, is a question upon which even technical opinions may differ. But inasmuch as the question is not at present within the domain of practical politics, it is not worth discussing. The fact of the hour is that the Gas Company are just able to pay their legal dividend by supplying 20-candle gas at the price named; and the figures of their revenue and working accounts are such as the most perfervid agitator cannot take hold of to use to their prejudice. Surely, there cannot be anything seriously amiss with the system under which these results have been achieved.

The Affairs of the Brentford Company.

THE position of the Brentford Gas Company is particularly interesting at the present time, by reason of the complete surrender of the Company's carbonizing plant to the principle of the inclined retort. An important change has also been made in the management; Mr. Frank Morris; who has been Engineer to the Company for many years, having retired from this post, and been elected to the seat upon the Board rendered vacant by the death of Mr. J. O. Phillips. It is not too much to say that the

present condition of inclined retort carbonizing in the world is largely due to the tenacity with which Mr. Morris stuck to the principle after he had once taken it up. At the recent meeting of the Company, the Chairman—Mr. Howard C. Ward—gave strong testimony to the value of the system to the Company, and to the perseverance of Mr. Morris in realizing its possibilities. Mr. J. Husband succeeds Mr. Morris; and of the propriety of this appointment there cannot be two opinions. The report of the meeting of the Company which we published last week is well worth reading by all gas engineers desirous of learning the best that can be said concerning the performance of the inclined retort system in its first English home. More than this, Mr. Ward's speech is an instructive little dissertation upon the fashions in which a modern gas undertaking develops under contemporary conditions. The Brentford undertaking is increasing very fast, as the large and straggling district becomes filled up. It has a great future before it; and the proprietors and the public are to be congratulated upon the affairs of the Company being in strong and capable hands.

An Extravagant Business at Matlock.

THE statement that appears in another column respecting the outcome of the Matlock Bath gas arbitration is of too serious a character to pass unnoticed. Here was a case of a gas undertaking with a total capital expenditure of under £12,000, and earning less than £3000 a year from all sources; the net profit balance for the past year being £536. It was proposed to transfer this property to the Local Authority; but as there happened to be two authorities interested in the undertaking—the works being in one district and the bulk of the consumption coming from another—there was a triangular fight over the transfer, ending in two arbitrations. The value of the property, including the book debts and sundry stores, was found to be £17,533, which sum was duly paid by the Matlock Bath and Scarthin Nick Urban District Council; but the expenses of the parliamentary and arbitration proceedings of all the parties ran up to £8000. The Company's costs for obtaining the Provisional Order, opposing the District Council's Bill for Compulsory Purchase in both Houses of Parliament, and conducting the double arbitration amounted to £3003, besides which the expenses of the liquidation had to be paid. Out of the £17,533 awarded by the Arbitrator (Sir W. Coddington) as the price of their property, there was handed over to the Liquidator for distribution among the shareholders £12,641, out of which his own costs would have to be deducted. Besides this, there are the costs of the two Local Authorities, which, as already remarked, swell the bill for all these proceedings to £8000—almost 50 per cent. of the value of the property in question. There have been many scandalous cases of squandering money upon Gas Bills and arbitrations; but it may be doubted whether there has ever been a more glaring instance than this of Matlock. Yet the Company did not court the experience, and only strove to protect the shareholders' property. This they barely succeeded in doing; for the balance of the purchase-money in the hands of the Liquidator just returned the capital expended to the end of the year, with expenses. All the premium goes in costs. The case of the two Local Authorities is worse; for one of them has nothing at all to show for its money, and the other has a lot of dead capital to repay. It is difficult to say who is really to blame for this waste of good money; but it seems pretty clear that the responsibility rests first and last upon the Local Authorities. They will, of course, shift the blame upon the "system;" and the example may be heard of again as an illustration of the costliness of our Private Bill legislation procedure. If the property in dispute had been ten times as valuable, the expenses would not have been greater, and would not have loomed quite so largely against the background of the capital involved. All the same, it is a scandal that any business of the kind should be so expensive to conduct.

The Dispute in the Engineering Trade.

LAST week a large amount of newspaper writing was done upon and round about the subject of the dispute in the engineering trade; but, except that the area of the dispute continued to enlarge as fresh districts joined the Employers' Federation, there was no notable change in the general situation. Violence was perpetrated by the strikers in several places; and some large works were closed altogether on this account. On the whole, however, the dispute has so far progressed quietly enough—a condition that may not endure to the end, when the men have grown desperate. Already the lock-out has lasted over the period when, by invariable rule, the issue might be considered doubtful. Where men win, in disputes of this kind, they win early—as, indeed, they claim in the present instance to have gained their point with many London firms. The others, however, having stood out so long, can hold on for any length of time. Naturally, the members of the A.S.E. employed in the provinces are very wroth at being locked out because the London men want the 48-hour week; and for the present Messrs. Barnes, Burns, and the other agitators, are doing their utmost, and with some success, to direct this indignation upon the employers. The probability is, however, that in time the sufferers will come to see that it is their own leaders who have precipitated this issue and are responsible for the dislocation of trade. There is an absurdity in nine-hour men striking in order that eight-hour men may win, which will appear more and more glaringly as the struggle goes on. Moreover, as Sir Benjamin Browne has pointed out in Newcastle, the A.S.E. case for the eight-hour day is sought to be supported by two mutually antagonistic pleas. The first—which is usually put before employers—is that they will lose nothing by conceding the 48-hour week, because the output of their works under the improved conditions will be as much as, if not more than before. The second argument—addressed to the men and the general public—is that eight hours are long enough for the working day, and that so many more hands will be required that the problem of the unemployed will disappear. The agitators have never pretended there is any special virtue about an eight-hour day. It is only a step in the direction of adjusting the number of workmen required to that of men available for employment, and is a beautifully simple idea. If the eight-hour day proves to answer the purpose, well and good. If not, then there must be a seven or a six hour day forthwith. Upon which card do the A.S.E. stand to win? Divided counsels never yet gained a cause; and it will be impossible for such a result to be achieved here, especially as the forces on the other side are united on the clear principle of maintaining the employers' position.

The Meeting of the British Association.

THE British Association for the Advancement of Science are meeting this year in Toronto, under the presidency of Sir John Evans, the eminent archæologist. It is the laudable practice of the Association to give representatives of every science their turn in the chair; but the working of the system this year has been to deprive us of any chance of taking notice of the presidential address, which dealt mainly with the question of the antiquity of man. The gathering seems to have been very successful in point of numbers; while the quality of the sectional presidential addresses, and of the papers, was equal to the average. We shall in due course notice some of these contributions to the proceedings. At the meeting of the General Committee, regret was expressed that Mr. Vernon Harcourt had decided to retire from the position of General Secretary of the Association. A warm tribute was paid to him for his invaluable services rendered in this capacity during the past fourteen years; and Professor Roberts-Austen was nominated as his successor. The era has gone by when the best work in science was reserved for publication to the world through the agency of the British Association; but circumstances still conspire to make the meetings of this body favourite occasions for the promulgation of scientific novelties in fact and theory. The Association provides its own public, with digestions strong enough to deal with the most humdrum or extraordinary addresses and papers; and outside there is a waiting world unoccupied with those political and fashionable topics usually engrossing attention. So it happens that late August and early September the newspaper reader will contentedly gorge himself with stories of fossil fishes and the habits and customs (mostly bad) of prehistoric man, which would not appeal to him with equal force in June. The people of Toronto have received the members of the Association very hospitably; and it is rather a pity that the other British colonies and dependencies are too far off for a repetition in their case of such a "loan exhibition" of British contemporary leaders in science.

End of the Penrhyn Quarry Strike.

THE Penrhyn quarry strike is over at last, terms of settlement having been agreed upon at a mass meeting of the men on Saturday, with "three cheers for Lord Penrhyn" by way of seal to the new covenant. In the circumstances, it seems almost invidious to inquire which side has won; but justice requires that this point should be cleared up. The "popular newspapers" of course gave the news on their contents bills as a victory for the men, because the "right of combination," for which by a transparent fiction the strikers were supposed to be contending, has not been denied by Lord Penrhyn. Everybody who has taken the trouble to read Lord Penrhyn's statement of his case knows, however, that he has explicitly admitted from the first the right of the men to belong to any organization they please. What the strike leaders really wanted was the power of managing the quarry in their own interests and that of their Union. This they have not gained; and the character of the settlement now agreed upon may be best described by saying that the men have accepted the terms offered to them by Lord Penrhyn in May, which are practically identical with those against which they struck in September last year. As work does not begin again until the end of the week, it follows that the strikers have sacrificed 48 weeks' wages without effecting any other result than disorganizing the slate trade, and creating an opening in this country for the American article. The terms of the settlement are published in full in "The Times" of yesterday, together with Lord Penrhyn's offer of May, which the strike leaders then prevailed upon the men to reject. Having maintained his position, Lord Penrhyn has been generous to the men individually and collectively. There is to be no "black list," and no men are to be "marked." All are to be reinstated as far as possible upon the footing occupied before the strike. The men may have their Quarry Committee, if they like; but this much-canvassed body will not have the right of standing between the men and the management, as it did when Lord Penrhyn first took the property into his own hands twelve years ago. The state of the quarry then was deplorable; and it was as much for the sake of the bulk of the workpeople as for his own protection that his Lordship put an end to this tyranny of the Committee. The whole object of the late struggle was the recovery of this power for the Union leaders; and whatever may be claimed by the popular Press, it cannot be denied that the attempt to reverse the working rule of the past twelve years has completely failed. "The first clause "as it now stands, as it stood last May, as it stood last "September, and as it has been worked for the last twelve "years, gives every workman access to the local Manager, "with appeal to the General Manager, and finally, in "cases of importance, to Lord Penrhyn himself; . . . "but it refuses to permit a standing Committee of "Trade Union leaders to constitute itself the sole "medium of communication between Lord Penrhyn and "his workmen, and to use that position to coerce the "workmen on the one hand and the employer on the other. "The men can combine as they please, and the Union can "form as many Quarry Committees as it pleases. Lord "Penrhyn has nothing to say against these proceedings." But he has defeated the attempt to set a Quarry Committee over his own head, and in tyrannical power over men who might not desire to belong to the Union. It has been a stubborn fight; but Lord Penrhyn has done a great service to his country in standing out for the cause of freedom and fair play against the forces of the newest form of despotism.

The Bandsept Burner.—Our readers will doubtless remember that Professor Lewes, in the course of his lecture at the meeting of The Gas Institute in Bath, referred in high terms to the burner invented by M. Bandsept, of Brussels, which he characterized as "by far the most valuable bunsen burner for mantle use that has yet been devised." We learn that the British rights of M. Bandsept's invention have been acquired by Mr. C. E. Masterman, Assoc.M.Inst.C.E., whose name is known to many of our readers from his connection with the Denayrouze Syndicate. He finds that the Bandsept burner increases by from 25 to 30 per cent. the light given by any of the mantles now in general use. It is similar in size to the ordinary Welsbach "C" burner; and it can be fixed to existing fittings. Its consumption is about 4 cubic feet per hour; and Mr. Masterman states that with the ordinary Sunlight mantle, at a pressure of 14-10ths or 15-10ths, it will give a light of from 17 to 19 candles per cubic foot of gas, after burning for a few hours.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 446.)

THE course of the markets for the most part in the Stock Exchange last week was somewhat irregular and fluctuating. At the opening, the tendency was towards improvement; the feeling regarding affairs in India being less sensitive. But business remained very quiet, and things drooped for lack of support. Later on, as apprehension in relation to proceedings in the East again revived, the tendency was decidedly flat; but once more things took a better turn before the close. All securities affected by the price of silver were heavily hit by the extraordinary fall in the value of this metal. It may be worth while to record that the price actually touched 2s. per ounce—a figure which, not many years ago, would have been regarded as inconceivable. The Money Market was much easier; and Consols and other gilt-edged securities profited accordingly. Business in Gas issues was really pretty fair, considering the time of year; but movements were extremely slight and unimportant. Very few changes in quotations took place, affording no pronounced indication of any general tendency. In Gaslights, the "A" opened unchanged, and business was done for the first few days at about 314. But not evincing much strength, it fell away a point; and after touching 312½, it closed a shade better. The secured issues were rather neglected; a few dealings in the "H" 7 per cent. and the "J" 10 per cent. at about middle figures being all that was marked. South Metropolitan, however, was disposed to improve; and after opening with a "special" bargain at 144, it reached 147—the quotation showing an advance of 1 point. Commercials were firm and unchanged. Among the Suburban and Provincial undertakings, the only one to attract notice was Alliance and Dublin, which was at first marked down and afterwards put up again. The Continental Companies were moderately dealt in, especially Imperial, which remained steady and unchanged throughout. None of the rest afforded anything calling for remark. Business in the Water Companies was very tame, and devoid of interest. Movements were slightly irregular; but the greater tendency was in favour of higher prices.

The daily operations were: Gas stocks were not particularly active on the opening day, and prices generally were unchanged; but Alliance 7 per cent. fell 1. Tuesday was quieter still; and all Gas issues remained unchanged. In Water, New River advanced 3. Things remained in about the same position on Wednesday; but Alliance 7 per cent. recovered ½. In Water, Kent rose 1; and Lambeth tens, 2. There were more transactions on Thursday, mostly in Gaslight "A," which fell 1. Alliance tens rose ½. Business fell quiet again on Friday; but South Metropolitan improved 1. In Water, East London fell 1. Saturday was almost a blank day; and quotations throughout closed unchanged.

ELECTRIC LIGHTING MEMORANDA.

The Board of Trade Returns—The Case of D—— and the Argument of the Tout—Local Vanity—The Shyness of Private Capital.

THE usual return to Parliament under the Electric Lighting Acts has been made by the Board of Trade. It will be as well to premise that this report does not touch the financial side of electric lighting undertakings. We are sometimes applied to by readers for information concerning these undertakings of the kind supplied by the Board of Trade returns relating to gas supply; and we are obliged to reply that no such particulars are issued. This is to be regretted in the interests of ratepayers and others, who are consequently liable to be cajoled by electrical touts, and persuaded that electric lighting is a better paying business than is actually the case in the vast majority of instances. All electric light undertakings carried on under statutory powers are bound to file their annual accounts with the Board of Trade; and these are individually accessible by anybody who can show a reasonable claim to inspect them. There is not in existence, however, any general official statistical compilation exhibiting the financial and commercial side of British electric light undertakings, which is a circumstance greatly in favour of the machinations of the touting electricians already alluded to. In time, doubtless, this omission will be rectified; but we believe that up to the present the officials of the Board of Trade have not settled the form which such a return should take.

It seems a strange thing that members of local authorities, with all the technical and general Press before them, should yet be so completely ignorant as they very often are of the facts of municipal electric lighting enterprise. Take, for example, the case of a small town recently brought before us which, not to be invidious, we will call D——. There is a population of about 10,000 people, mostly of the artisan class, and of a poor order at that. Practically, the local government of the district is in the hands of one bigwig—not much of a bigwig after all, but still the most prominent personage of his village, which is a condition to be preferred, according to Cæsar's dictum, to that of being the second man in the capital. This notable has a following of

three or four in the District Council, whereby he is usually enabled to force his own policy upon this body. It is easy to understand how powerful in his own neighbourhood such a magnate really is. Happily for the nation, such village notables are almost invariably honest men, whose commanding position is the natural consequence of their local standing; and they mean well.

Unfortunately, it is precisely these men of local "light and leading" who become the easiest victims of the electrical tout. In their eager desire to place their district in the forefront of civilization, they are predisposed to listen to the plausible, well-spoken gentleman who assures them that electric lighting is the one thing needful for the place. So many towns have taken to it, and shall D—— lag behind? Look at Liverpool, where the Corporation had to pay through the nose for letting an electric light company develop the business first; look at Brighton, where everybody uses electric lighting, and the householder who takes it for the longest time gets it dirt cheap; look at half-a-dozen other places where the chairmen of the corporation electric lighting committees are prepared to declare that this business is, or is going to be, a good thing for the town! This is the sort of advocacy that gets home to a local patriot, and makes his soul so keen for a central station plant that he will not hear any arguments against the idea.

That curious sentiment, parochial pride and vanity, powerfully aids the wily electrical tout. Local magnates affected by it cannot see why their own district should not be as well able to support an electric lighting undertaking as any other. Is it a purely residential district, with a small business quarter and all the rest fairly covered with good house property standing in private grounds? Then, obviously, here is the very place for electric lighting. Is it a manufacturing or commercial centre? Then smart business people must need the newest kind of light to do their work and show their wares by. Is it a poor neighbourhood, where the rates are heavy and their product small? Then has not Mr. W. H. Preece declared electricity to be the "poor man's light," and would it not be a splendid thing to make a profit out of electric lighting in aid of the rates?

So the local authority is won over to the side of the electrician, often against the better judgment of a minority of councillors and ratepayers—including the gas company—who know better. Of course, what the gas directors and management may say does not weigh with anybody against the estimates and assurances of the electrician who is good enough to advise the local authority. He, clever man, has not the smallest doubt that a public electric lighting station will pay well, even in D——. It is a miserable place for trade; but his estimates are endorsed by a responsible construction company, who will engage to carry them out with efficiency and despatch. Not a word is said about extras, or the open capital account that mocks the hopes of profit of nine out of ten electric lighting undertakers in the kingdom. There is no delusion respecting the profitableness of a "day load," the working of tramways, rubbish destruction, or anything else reputed as a means of reducing the cost of electricity supply, that will not go down with the autocrats of places like D——. If they form themselves into a deputation, and start in search of electrical knowledge, they only go where they can get confirmation of their own wishes, and return no wiser than they were before. So it comes to pass that the present Board of Trade returns show that during the past year 55 applications for Provisional Orders have been received, of which 42 were from local authorities and only 13 by companies or persons. If the London applications are taken out, only seven instances remain where private capital was involved. These were not very promising cases, apart from the extensions of old concerns; but they are the pick of the bunch.

"Masonry Dams."—Mr. C. F. Courtney, M.Inst.C.E., has written a small treatise on the construction of masonry dams that should be useful to all who are interested in this important branch of civil engineering. The impounding of watercourses for various objects—water supply, irrigation, or manufacturing purposes—is a class of engineering work that tends to come into greater rather than less request as the natural resources of all countries become gradually drawn upon to their full capacity. If Mr. Courtney does not pretend to tell "all about it" in this book, he nevertheless treats the subject in the manner in which a practical engineer would naturally handle it; and hence his work possesses an air of completeness and thoroughness that renders it a model of its kind. Mr. Courtney's style is so easy and apparently cursory that the great practical value of his observations almost escapes the appreciation which is their due. If some professional text-book writers had his matter to work up, they would beat it out into a large and elaborate volume, with heavy type in places to mark the important points. In Mr. Courtney's case, however, the student has to bethink himself as he goes on that every line is charged with deep significance, and that the author's words express, without straining after impressiveness, the results of large experience. Altogether, the work is a masterly production; and we hope Mr. Courtney will not stop at masonry dams, but go on to give the world his knowledge of retaining walls, earthworks, and other applications of engineering science and practical experience. The book is published by Messrs. Crosby Lockwood and Son.

THE ANNUAL MEETING OF THE SOCIETY OF CHEMICAL INDUSTRY.

THE annual meeting of the Society of Chemical Industry, held this year in Manchester under the presidency of Dr. Edward Schunck, F.R.S., was briefly recorded in the "JOURNAL" for the 20th ult. It is due to this important Society and its eminent President that the occasion should be noticed here at greater length, now that the official report of the meeting and the presidential address have been published in the Society's "Journal." We would pause first to draw attention to the wise principles upon which the transactions of this Association are based. Everything appears to be done, in accordance with the most approved modern principles, to further the chief end of the Society's existence—the collection and dissemination of technical information, and the promotion of the circulation of knowledge among the members and those of the general public who take an interest in the progress of chemical industry. At great expense, the Society publishes its own "Journal," simply because no other suitable agency of publication exists. Any newspaper or periodical is, however, at liberty to reproduce whatever its conductors may consider of sufficient interest for their own readers in the Society's transactions; and the "Journal" itself reports the sectional meetings before their proceedings become stale—differing with advantage in this respect from the official record of almost every other scientific and technical society. It seems hopeless to attempt, even with this example to go upon, to convince secretaries and councils of old-fashioned technical societies that freshness is of the very essence of the value of most professional papers. Yet a very little reflection would suffice to show that it must be so. The number of technical papers of permanent value, relating to any branch of science or of industry, which are produced during the lifetime of a generation, is very small. There are more that are worth preserving as historical evidence of the character of works erected and apparatus introduced; but the great majority are useful, if at all, merely as passing indications of the need for, and suggestions of means of, improvement. With still greater force is this to be said of the discussions attendant upon the reading of these communications. How ill-advised it is, therefore, that these ephemeral lights upon the condition of a living technic should be jealously shut up from public view in the decent obscurity of "Transactions" appearing once a year, and often more than a year after the date to which they refer.

The annual gatherings of the members and friends of the Society of Chemical Industry are mainly devoted to the object of bringing these congenial souls together, for mutual refreshment; while at the same time means are supplied, in the shape of visits to works and a few addresses, for enabling technicians to note "the time of day" in their industrial pilgrimage. In other words, the annual meeting is not a season of harvest, but seed-time. The presidential address is usually interesting and instructive in a high degree; and this honourable tradition was worthily maintained at Manchester. Dr. Schunck himself is an interesting example of the acclimatization of Continental science in this country, which is otherwise so well exemplified in the persons of Schorlemmer, Mond, Levinstein, and others who might be named. Moreover, Dr. Schunck is notable for his old connection with that department of chemical industry which is so often cited in discussions upon the circumstances and prospects of the industry in this country—the chemistry of organic colouring matters.

The first portion of the President's address was devoted to a series of reminiscences of Manchester worthies more or less celebrated for their connection with the early days of the local chemical industries. The second division was concerned with the chemistry of organic colouring matters, principally those of vegetable origin. It was observed that, notwithstanding the artificial production of indigo-blue by Baeyer and others, the substitution of the artificial for the natural product has not been successfully effected. It is different in the similar case of artificial alizarin, which has entirely taken the place of dyeing with the natural product madder-root. Alizarin itself, however, more especially Turkey red, is now subjected to severe competition from a new and brilliant red dye, paranitraline red, which has come to the front of late. Passing to the subject of water supply and sewage, Dr. Schunck admitted that the latter question is, so far as Manchester is concerned, surrounded by difficulties almost insuperable. The impounding of the waters of the one local river by the Manchester Ship Canal has caused trouble which hitherto has defied all attempts to prevent or cure. In the meantime, the President took leave to doubt whether the strictly sanitary aspect of the Ship Canal nuisance is so grave as has been asserted. He questioned whether there is justification, on the highest and most urgent grounds, for saddling the towns and manufacturers of Lancashire, in face of a declining trade, with the enormous outlay which would be necessary in order to effect the purification of the rivers to the satisfaction of the authorities.

Dr. Schunck proceeded to discuss the subject of impurities of the atmosphere, as being something more important to town populations generally than the pollution of rivers and streams. "Impure water we may escape from. We have no occasion to

use it, owing to the abundant supply of a wholesome article in most of our large towns; we need not dwell by polluted streams unless we choose. But impure air we cannot avoid. We are constantly enveloped by it; we draw it in with every breath, and are always exposed to its effects; and yet less seems to be done to neutralize its injurious influence than that of impure water." So much has been done by distinguished investigators in establishing the composition of pure and impure air, that Dr. Schunck felt it would be useless for him to add a word to what they have said. Whether any improvement has taken place in the air of Manchester as regards the less obvious impurities the President was not prepared to say; but as to the most obvious and obnoxious impurity—coal smoke—he had no doubt that "matters are much worse than they were years ago." He finds, as the result of certain observations from his own residence, which stands in an elevated situation, some 200 feet above the river level, that the total amount of smoke in the atmosphere of Manchester and Salford is much increased of late. "That this increased amount of smoke is due, as is sometimes asserted, to the number of small tenements erected of late years is, I think, not correct. Anyone looking down from a height on the town, with its numerous chimneys, must be convinced that the chief part of the smoke comes from factories and works generally, whether new or old, not from small tenements. The state of things now prevailing is a disgrace to our manufacturers, a disgrace to our municipalities, a disgrace to the community generally." It is quite refreshing to meet with this vigorous denunciation of the smoke nuisance of Manchester from one who cannot be accused of being a faddist, or a person unmindful of local industrial interests.

The President went on to observe that probably the amount of black smoke emitted by the Manchester chimneys might be reduced by careful stoking; but he did not profess to be an authority on the subject. He remarked how, in dull, close, and foggy weather, the air of the city is particularly vile; whereas it is comparatively pure and pleasant during and after rain. "This would suggest the possiblity of producing in our streets something like artificial showers of rain. A rose with small holes being attached to the end of a water-hose, water might be made to descend in fine rain; washing down the suspended carbon, the sulphurous acid, and other impurities, at the same time watering our streets quite as efficiently as it is done at present by the driblets proceeding from our water-carts." The spectacle of Manchester fitted up with artificial rain-making appliances to supplement the natural dampness of the climate, is not an engaging one. Dr. Schunck himself felt that he was talking "in the air;" for he confessed that, liberal as is the local water supply, it would scarcely be sufficient to wash the atmosphere as well as supply the city. He added a few words on the desirability of filtering the air supplied by artificial ventilation arrangements used in town hospitals and public institutions; but he fully admitted the practical difficulties of the subject.

Turning to the vexed question of Continental competition with English manufactures, the President remarked how it might be inferred, from the speeches so frequently heard, that the danger is real and imminent, and that it behoves us with all possible speed to build and endow technical schools in which our workmen and others shall be trained so as to enable them to compete with the more highly educated class of similar standing in Germany and France. The President professed to be too little in touch with the manufacturing industries of the present day to say whether the danger is real and present, or whether it is merely apprehended and distant. Judging, however, from his own observations of Continental travel, Dr. Schunck was bold enough to state that "competition with this country in many articles of trade is, at present at least, quite chimerical." Continental peoples, in short, have under their existing fiscal systems to put up with many inferior articles of commerce, instead of the really good, substantial commodities we could sell them, or they might produce for themselves under the healthy influence of competition. "In some departments of industry, especially the chemical and more particularly that of colouring matters, foreign competition is, I suppose, a very serious matter; but whether the evil is one that can be remedied by mechanical and educational measures seems to me doubtful." The fact is that successful foreign competition may be due not only to superiority of education and training, but also to the existence of certain inscrutable—perhaps moral—qualities of which it is difficult to estimate the weight and bearing.

Why should we not recognize the various kinds of genius that characterize not only different nations, but also in a minor degree different localities of one and the same nation? "Why should we not, in accordance with the principles of Free Trade, buy what we want where we can buy it best and cheapest?" Here we have Free Trade in a nutshell. This is the principle of trade which, as the President justly claimed, is unassailable, and which he believed must eventually prevail everywhere. Meanwhile, however, the vagaries of Continental Protectionists, the iniquities of the bounty system, and the inequalities of patent laws lay upon Free Traders burdens which are hard to bear; and even Dr. Schunck had some severe things to say of the system that crams England with beetroot sugar, to which he was not prepared to accord equality for dietetic purposes with the product of the cane.

Although we have only been able to skim certain parts of Dr. Schunck's address, it will be readily understood that it charmed the members of the Society of Chemical Industry, who heard it in full, and that it well repays perusal in the official report. There is nothing more to be said about it here, except to congratulate the Society upon becoming the agency for the promulgation of so much wisdom relating to a variety of topics which have so often received very different treatment.

THE PARLIAMENTARY RETURNS RELATING TO GAS UNDERTAKINGS.

Within the last few years, more frequent references have been made to the above-named returns than formerly—by some to illustrate a particular phase of a presidential address, or to emphasize the importance of the industry; by others, in connection with matters of greater moment, as, for instance, the financial position of a gas undertaking. The facts drawn from the returns on the latter point are not always conclusive or even satisfactory. This cannot be otherwise. The returns are but registers of the financial condition and practical working of undertakings established and carried on under ever-varying conditions. The date of formation and incorporation, local influence, the nature of the district supplied and its resources, the carriage of materials, the relative position of collieries, and the quality of the coal—all these matters influence the financial and working condition of a gas undertaking; and the effects may be seen in results obtainable from the workings of the returns. For example, if the coal carbonized be taken as a measure for a comparison of capital between two undertakings, there is one case in which the capital employed per 1000 cubic feet of gas sold is about three times that of another otherwise comparable undertaking. A further example may be found in the consumption of gas per mile of main. Of two large works, one has more than double the consumption of the other. In other matters, there is a very great diversity in the results obtained from the working out of the returns; and therefore the attempt to arrange and classify the results under certain circumstances appears almost a hopeless task. Works of about the same magnitude differ so greatly that, for purposes of comparison, some would have to be placed with much smaller, and the others with much larger undertakings.

Though there are apparently great diversities in the results from the working out of these returns, yet there may be evolved from them reliable and valuable data for comparison and guidance. We have before us the results of some good work done in this direction by Mr. W. J. Warner, of South Shields. It takes the form of diagrams, so arranged that, while giving the average working of the returns, the individual results may be placed, as on a chart, for comparison. The title of the sheets is: "Diagrams of the Annual Average of Parliamentary Returns—Gas—1887 to 1895 (the Last Returns). Private and Public Undertakings Grouped—1895 and 1896 Workings." The diagrams then become standards for working. Their scope is shown in a "Compendium" as follows:—

The workings shown by the diagrams are per 1000 feet of gas sold. Capital, premium, total receipts, and expenditure only are portrayed, to avoid confusion. Other workings, gas sold per ton of coal carbonized, the consumption per mile of main, &c., are given in figures for their influence on the diagrams to be estimated. Of the three sheets of diagrams, A is a continuous chart of yearly workings of private undertakings; B, a continuous chart of yearly workings of public authorities; C, the yearly workings of both, grouped for comparison by the quantity of coal carbonized. Diagrams A and B show from year to year the average workings, and thus give a standard for comparison and reference. The single undertaking, or group of undertakings, being projected to scale on Diagram A or B in coloured ink, will form a clear working chart from year to year. Diagram C—the groups—will give a standard for closer comparison for working than the average of the totals of the undertakings, A and B. The workings of the undertaking for comparison are to be filled in with coloured ink in the column "Compared Undertakings" to the right of the Chart C. As standards for comparison, the sheets should be used only upon broad and general principles. Only by those practically acquainted with the past and present of an undertaking can a true estimate of its position be made. The diagrams will be useful to all interested in gas undertakings for reference, comparison, and as a continuous record of yearly workings.

We will now proceed to explain the diagrams. On the one set of sheets is projected over the years named a chart showing the average workings of capital, expenditure, and receipts; the averages of the other workable columns of the returns being given in figures in the columns of the diagrams in each successive year. On the other sheet are projected the averages of the several groups into which the whole return for the year is divided. The chart, as in the former sheets, consists of capital, expenditure, and receipts; and the other workings of each group are shown in figures. A vacant column is arranged for the working of the individual undertaking to be placed for comparison with its own group.

In the sheets of yearly workings, the value of the arrangement appears to consist in the results of workings over a number of years being given, by which the effects of general influences upon the industry may be seen—a matter of great importance in the administration of such undertakings. Take, for example, capital. The diagram shows the potent force of premium in one case and of the redemption of money in the other. In like

manner, the gross profit—the difference between receipts and expenditure—is shown. Thus the general tendency of the fluctuation of workings extending over a long period may be learnt. The results of individual workings, being projected upon the same sheets, are comparable with the general workings thus employed as standards; the whole really forming a working chart.

The workings of the returns, however, it must be borne in mind are those of the whole returns; and it is with these as standards that the workings of the individual undertakings are compared. A closer, and therefore a more practical, standard is desirable. The groups meet this requirement; the whole of the returns being divided and classified, by the quantity of coal carbonized, into groups as follows: (I.) Coal carbonized under 1000 tons a year; (II.) from 1000 to 4000 tons; (III.) from 4000 to 7000 tons; (IV.) from 7000 to 10,000 tons; (V.) from 10,000 to 50,000 tons; (VI.) all upwards of 50,000 tons. This refers to both private and public undertakings; and the workings are projected upon the same sheet, and thus jointly form standards for individual undertakings—a vacant column being provided for the workings, its comparable group being fixed by the coal carbonized.

Attention has been directed to the disparities in the results of the workings. They are common to both private and public undertakings, and vary considerably in each. The groupings, however, have been so arranged that in them all irregularities have been removed, and on the diagram a relative proportionate figure is shown, except of the first group, of the private capital, which appears to be abnormally high. This might probably be modified by a further division of these undertakings. But, of course, in this group there must be great differences in the position, means, and resources of the undertakings. The other groups give in their relative workings a most satisfactory diagram; and they must confirm the general opinion, so long held, that the larger the undertaking the smaller the amount of capital employed per 1000 cubic feet of gas, with greater economy of working, and with better results per ton of coal. But this, by the diagram, appears to hold good only to a limited extent; or, rather, it is not of uniform action, at least in the matter of the capital of public authorities.

To enter further into this matter would carry us beyond the scope of the present notice. The groupings are undoubtedly a new and most interesting arrangement, and give broad practical standards for close comparison. In the whole set of diagrams there are the means of making the comparisons and recording them from year to year with but little effort. Such charts will thus become valuable indicators of the general as well as the particular influences which may have been in operation. These yearly records, too, will always be ready to answer any inquiry, to correct any misapprehension, and to confound any misstatement. In the diagrams will be found a graphic representation of practical workings extending over a number of years, which may be read with ease, and with which most valuable comparisons may be made without effort.

PERSONAL.

Mr. J. W. Tagg, a son of Mr. S. Tagg, of Nottingham, has been appointed Manager of the Uppingham Gas Company.

The will of the late Mr. J. Orwell Phillips has been proved by Mr. Joseph Reeson and Mr. James M'Kelvie. The personalty is returned at £70,633.

Mr. G. Robinson, who has for the past four years been Manager of the Castle Donington Gas-Works, has been selected to fill a similar position with the Brecon Gas Company—advertised in the "Journal" last month, No. 2879.

Mr. J. Foster, of Nelson, who has been appointed Manager of the Leigh (Lancs.) Gas-Works, has received a testimonial of the respect and esteem of the employees at the gas-works in the former place, in the shape of a silver tea service bearing a suitable inscription.

The recent death of the Chairman of the Tottenham and Edmonton Gas Company (Mr. G. Gripper, J.P.) has necessarily caused some changes in the directorate. He is succeeded in the chairmanship by Mr. Corbet Woodall, whose position as Deputy-Chairman will be filled by Sir Henry Cartwright. Mr. D. Ford Goddard, M.P., has been elected to the vacant directorship.

Availing themselves of the provisions of the Honorary Freedom of Boroughs Act, 1885, the Manchester Corporation have conferred the honorary freedom of the city upon Dr. A. W. Ward, who is relinquishing his position as Principal of Owens College. The motion submitted to the Council with the above object was cordially supported by Sir J. Harwood, who paid a high tribute to the work done by Dr. Ward, who, he said, had given an impulse and a quickening life to all the educational institutions of Manchester.

A pleasant gathering was held in the engine-house of the Uxbridge Gas-Works a few days ago, when Mr. Septimus Penny, Assoc.M.Inst.C.E., who, as already mentioned in the "Journal," has retired from the position of Engineer and Manager, which he had filled for some years, was presented by the past and present employees with an address, accompanied by an inkstand in silver and oak, and Mrs. Penny with a silver-mounted toilet scent-bottle. The presentation was made by Mr. Price, the general foreman. In acknowledging the gifts, Mr. Penny sincerely thanked the donors for them, and also for their loyal co-operation and cheerful obedience in times past, which, he said, had tended to make his long period of command so pleasant to look back upon. He concluded by expressing the hope that they would work as agreeably with his successor as they had done with himself.

Issue of Additional Stock by the South Metropolitan Gas Company.—The Directors of the South Metropolitan Gas Company announce their intention to sell by tender £43,333 of 3 per cent. perpetual debenture stock, in accordance with the provisions of the Company's Acts of 1882 and 1896. No tender will be accepted at a lower price than £105 per £100 of stock.

Manchester District Institution of Gas Engineers.—The 111th quarterly meeting of the Institution will be held next Saturday at Elland, the residence of the President, Mr. R. Porter. The programme issued by the Hon. Secretary (Mr. S. S. Mellor, of Northwich) shows that the business portion of the meeting will not be very heavy. In fact, the Association will really be the guests of the Chairman and Directors of the Elland Gas Company, who have generously undertaken to provide light refreshments, luncheon, and conveyances for the members. The morning will be spent at the gas-works, which will be described by the President. A move will then be made to the Town Hall, where luncheon will be partaken of, and the business—consisting chiefly of the election of twelve new members—transacted. In the afternoon there is to be a drive through Stainland to Ripponden and Sowerby Bridge. On returning to Elland, tea will be served in the Town Hall.

The Preparation of Improvement Bills.—The Select Committee on the Police and Sanitary Regulations Bills of the past session agreed upon a special report, which has been published, with the proceedings of the Committee, as a Parliamentary Paper. The Committee had referred to them all Private Bills promoted by municipal or other local authorities proposing to create powers relating to police and sanitary regulations which deviated from, or were in extension of, or repugnant to, the general law. They state that clauses are inserted in Improvement Bills in many instances which cannot be supported by evidence of local requirements, or which do not meet such requirements. They think that much expense and time might be saved by the exercise of greater care in the preparation of Improvement Bills. They further express a doubt whether in all cases sufficient care is taken to ascertain, before the expense of a Private Bill is incurred, how far the desired objects can be effected under the general law or by means of Provisional Orders; and, finally, they strongly reiterate the suggestion previously offered, that the time has arrived for the inclusion in a Public Bill of many of the clauses so frequently introduced into Private Bills.

Naphthalene Obstructions of Street-Tamp Taps.—The question of having the taps of the street-lamp burners placed inside or outside the lantern was brought before the members of the Société Technique du Gaz en France, at their last meeting, by M. Plouchtchevsky. As may be supposed, the details furnished related to the author's experience in Russia. For something like a quarter of a century, the taps of the burners in the public lamps in a town situated in Central Russia were placed outside the lanterns without causing any inconvenience. But no sooner had generator furnaces been introduced, than trouble began to arise from naphthalene deposits. The taps in question were somewhat massive, and weighed close upon 13 oz. The gas was regularly purified, and the naphthalene deposits were caused by the variations between the day and night temperatures. During the month of July, the temperature of the gas in a burner-tube exposed to the sun rose to 50° C. (122° Fahr.) at about three o'clock in the afternoon, when the thermometer stood at only 40° C. (104° Fahr.) in the sun. This increase was favoured by the great mass of metal—weighing something like 240 lbs.—contained in the lamp-post and burner-tube, enclosing a very small quantity (0·1 cubic foot) of gas. On the other hand, the minimum night temperature outside fell in the above-named month to 12° C. (53·6° Fahr.); but before sunrise the gas that was contained in the pipe cooled to from 2° to 4° below the outdoor temperature. This night cooling habitually caused condensation of water on the inner surface of the pipe, and frequently slight deposits of naphthalene. The obstructions removed from the pipes were grouped into three classes, according to their appearance; and a series of experiments, undertaken for the purpose, enabled the operators to reproduce each kind, and to determine their relationship. The results arrived at led to the placing of the taps inside the lanterns, at a point about 3 inches below the flame; the effect of the change being that, with few exceptions, no further trouble was experienced from naphthalene. In the very severe weather of winter, however, deposits were found in the pipe; but they did not reach the tap. The author came to the conclusion that condensation and evaporation of the bodies contained in illuminating gas go on alternately during all the seasons of the year; but that these operations are very largely affected by changes of temperature.

NOTES.

The Fermentation of Water.

A paper on the causes and prevention of water fermentation, by Samuel M'Elroy, appears in the July number of the "Electrical Magazine." It bears upon the practical question of the keeping qualities of water drawn from various sources, which was raised at the recent Engineering Conference in London. Mr. M'Elroy declares that the fermentation of water is a subject that grows in importance with the rapidly-growing demand for, and distribution of, water in the various centres of population. The effect differs in period and intensity; but it is very common. The author accuses the authorities of some American towns of trying to hide this trouble: "The general panacea of these wise men is flushing the mains at the street hydrants—an operation performed at night." The efficacy of this treatment is disputed; and some startling allegations are made with respect to the character and origin of the water supply of Brooklyn, the fourth city of the United States. Unfortunately, the paper does not contain much positive information in regard to the prevention of water fermentation—indeed, the matter that should justify the title of the essay is conspicuously absent. Enough is said, however, to open up the question, and to show that the problems of the future in connection with the supply of reasonably pure drinking water to many of the large cities of the American continent will be of the very greatest difficulty and importance, compared with which that of the water supply of London is mere child's play.

Scale in Steam-Boilers.

Mr. Albert A. Cary has discussed at length in the "Engineering Magazine" the problem of the cure for corrosion and scale in steam-boilers. Though the trouble in question is as old as steam power itself, it is one that tends to grow more rather than less annoying with the advance of modern improvements in boiler construction and steam-engine design. Now that every source of expense in power production is so carefully looked into, the saving of the cost of water by returning to the boiler the condensation water is increasingly practised; but the greasiness of this water is a grave disadvantage of the system which no means of filtration yet devised seems competent to completely remove. Mr. Cary declares that almost every conceivable adaptation of filtration has been tried for the removal of oil, both from the exhaust steam and from water resulting from its condensation. For really successful filtration, two conditions are essential—slow passage of the fluid through the filtering material, and frequent cleaning of the medium. It is easier to formulate these conditions than to realize them in practice (say) in the case of a town power-generating station; and this difficulty is the cause of many of the failures experienced in this regard. A kind of coke scrubber, with baffle-plates, has been used for taking oil out of the steam itself before condensation; and this rough-and-ready device has the advantage that when the coke becomes too oily for further use as a filtering medium, it can be removed and fired into the boiler furnace. If the oily water gets into the boiler after all, the result is the production of the worst and most destructive kind of scale known.

The Disposal of Towns' Refuse.

A summary of the existing methods employed for the disposal of the dustbin refuse, or garbage, of towns has been prepared by Mr. Rudolph Hering, a member of the American Society of Civil Engineers. It illustrates the tendency of all civilized countries to solve the problem upon identical lines. The simplest way of disposing of towns' refuse is to put it upon waste land, or throw it into the sea or some large river or lake. The last-named expedient is only practicable where rivers and lakes upon the American scale are available. Emptying the stuff into the sea is unobjectionable where the currents disperse it thoroughly. The chief objection to putting garbage upon so-called waste land is the possibility of the land being afterwards built upon as the town grows; because the "tip" is rarely far enough away to begin with. Some years ago there was a craze for utilizing towns' refuse by chemical treatment. This was especially the case in some parts of the United States, where the unquestionable presence of fatty matters in garbage seemed to mark it out as suited for reduction by the cheap petroleum spirit, which was almost a waste product of the mineral oil industry. Three different processes, known as the Merz, Simonin, and Arnold systems, were developed in different localities. In the first two, naphtha is added to the garbage to dissolve and extract the grease; leaving the remainder to be used as ballast or diluting material for a better class of fertilizers. In the Arnold process, the crude refuse was boiled to extract the grease, which was removed by pressure filtration. In actual working, however, it was found that when economy was studied, it was impossible to take the necessary precautions for preventing nuisance. Generally speaking, it was impossible to work the reduction processes at a profit and at the same time without creating a nuisance. The largest plant of the kind in operation to-day is on Barren Island, for treating the garbage of New York and Brooklyn by boiling. There remains the cremation system, which is the only one that has proved successful in Europe, and is spreading in America; though, according to Mr. Hering, no American refuse destructor has yet been made to work satisfactorily without the addition of coal or other good fuel to the material treated.

Lighting by Reflection.

It is some years since attempts were made to get over the glare of electric arc lamps and render these powerful sources of light available for interior illumination by screening off the direct rays and causing the light to be reflected from the ceiling of the apartment. One or two banks in the City of London were lit in this way; but the device never became popular, as it was found impossible to do clerical work, without injury to the eyesight, by the light of the electric arc however modified. It was recently reported in the "Builder" that the experiment of lighting by ceiling reflection has been again adventured upon, in the case of the banqueting hall of the Royal Palace Hotel, Kensington. Our contemporary remarks in this connection that the style of lighting in question was recommended in its columns in the early days of electric lighting. In the present instance the room is lighted by "some hundreds of 16-candle power lamps" hidden under the cornice, from which the light is thrown on to the ceiling and thence reflected down into the room. "Of course, a certain amount of light is wasted in the reflection; but the glare of the lamps is removed from the eye, and there is also the pleasing effect produced of a light from no apparent artificial source—a kind of daylight effect." Evidently, money has been "no object" in the arrangement of this scheme of lighting; otherwise the employment of "some hundreds" of 16-candle power incandescent electric lamps would be a sobering necessity to start with. The loss of light by reflection from a white ceiling is not great; but lighting exclusively from the cornice, whether directly or by ceiling reflection, can only be appropriate in the case of a narrow gallery-like apartment. Moreover, the absence of the appearance of any means of artificial lighting is no improvement to any enclosed space. Reason requires to know how it is lighted; and it will not be satisfied with anything short of a full explanation—when, of course, the concealment so elaborately planned becomes a mere trick.

The Light of Fireflies.

The light emitted by fireflies has long been recognized as indicating the possibility of producing illumination of a certain intensity with far less expenditure of heat than that which goes to the production of the most economical artificial light. This natural luminescence has been investigated in different ways by numerous experimenters, notably by Professor Langley, who has determined its heat equivalent by his bolometer. Mr. H. Muraoka, Professor of Physics at Kioto, has recently tried the effect of the light of fireflies upon photographic dry plates, in conjunction with several metallic plates employed with a view to ascertain whether the light possesses qualities analogous to those of Röntgen rays. The experiments led to the following conclusions. In its original state, the light of the flies behaves like ordinary light. It also contains rays which possess penetrative properties analogous to the Röntgen rays or Becquerel's fluorescent rays. Some of the effects produced by the light resemble certain phenomena arising out of the permeability of iron by magnetism. Other conclusions more or less cognate to the foregoing are formulated by Mr. Muraoka; but it does not appear that his investigations have led any farther in the direction of producing light without heat by artificial means.

The Efflorescence of Brickwork.

The subject of incrustations on or efflorescence of bricks and brickwork through weathering formed the subject of an Inaugural Address by Professor Günther at the University of Rostock. Light-coloured stone surfaces were stated to be liable to the appearance of vegetable growths; but moisture and shade are required for their development. Mineral incrustations on walls are mostly white or grayish, more rarely yellow or green—these latter being due to vanadium. In appearance these incrustations vary, according to the solubility of the component salts, from floury or woolly powders to stalactitic masses; and they may result from various causes present either in the raw clay or introduced in the water employed in brickmaking, or from pyrites in the clay or fuel, or from the ash of the latter material. Again, the infiltration of soluble substances from the mortar, or combination of the alkalies in the latter with the gypsum in the bricks, or, finally, the absorption of nitrates from the soil and from the air of ammonia or sodium chloride (near the sea) may give rise to incrustation. Incrustation may come either from the bricks or from the mortar. While incrustations of calcium carbonate do no harm beyond spoiling the appearance of the work, soluble alkali salts repeatedly dissolve and re-crystallize in the cracks—ultimately producing disintegration. To prevent these incrustations, pyrites and sulphates can either be removed by the slow process of seasoning the clay by prolonged exposure to the weather before making up into bricks, or by adding barium salts to the clay before burning, so as to produce the insoluble barium sulphate. Another remedy is the prevention, in continuous kilns, of the oxidation of the sulphur present in the clay or coal beyond the stage of sulphurous acid; which may be effected by limiting the air supply. Finally, the bricks should be very thoroughly burnt, since in this state they are less disposed to absorb the moisture necessary for the extraction of the soluble salts. According to this survey of the causes of the unsightly efflorescence of brickwork, the evil appears to be traceable in the main to the employment of imperfectly weathered clay in the manufacture of the bricks, and their subsequent imperfect burning.

TECHNICAL RECORD.

NORTH OF IRELAND ASSOCIATION OF GAS MANAGERS.

The Papers and Discussions at the Meeting at Omagh.

We complete to-day our report of the proceedings at the recent meeting of the above-named Association by giving the papers read and the remarks made thereon.

Mr. P. EGAN (Tralee) read the paper which, under the *nom de plume* of "Hydraulics," he had submitted in competition for the gold medal offered by the Association, which, in the absence of another competitor, had been awarded to him. The paper was as follows:—

A DIFFERENCE IN HYDRAULIC MAINS.

Having been requested to contribute a paper to this meeting, it occurred to the writer, when looking for a subject, that any trouble arising in the retort-house, no matter how apparently trifling, should not be allowed to pass unnoticed, as, of course, any defect in this very important part of the plant may interfere seriously with the successful working of the whole concern, especially in the case of small undertakings. For this reason, and with the view of leading others to give their experience, he has brought the matter forward.

When the writer took charge of his works, the retort-house contained four beds of five retorts, each 22 in. by 15 in., and 7 ft. 6 in. long, with 5-inch ascension-pipes, tapering to 4½ inches at the top, and 4-inch H-pipes, all connected to a cast-iron hydraulic main 36 feet long and 16 inches in diameter, with one 5-inch outlet at the end for gas, tar, and liquor. A piece of 1-inch gun-barrel pipe, with a stopcock, was screwed into the side, and led to the tar-well. Presumably this was intended to lower the seal of the dips, which, it must be admitted, they in certain cases badly needed, as some of them were found to have a tar seal of 3½ inches. One of these beds was continually giving trouble with stopped ascension-pipes. So in the following year one-half of the hydraulic main was disconnected and taken down, some new stands procured, and properly levelled, and this half connected again with only two beds of retorts. The other half of the main was treated in the same way the next year, and a new outlet-pipe attached at the end, and connected to an 8-inch foul main passing round the house on its way to the condensers. The result was complete freedom from trouble with stopped pipes in those beds.

Some time afterwards, it became necessary to erect two new additional beds of retorts at the opposite side of the house. The retorts were 24 in. by 15 in., and 8 feet long, set five in each bed, with 6-inch ascension-pipes tapering to 5 inches, and 5-inch H-pipes; the hydraulic main being ⊔-shaped, 18 feet long and 22 inches in diameter, made of wrought-iron plate ⅜ inch thick, and connected to the 8-inch foul main. Everything being new, these two beds could not be got to heat very satisfactorily for the first three or four seasons. Therefore, when next the retorts were renewed, it was determined to have a change. Then some alterations were made in the settings; the exit-flue on the crown of the arches being closed, and new uptake-flues built in the back wall with dampers on the top. The heats then became excellent; but a very unpleasant change took place in the form of choked ascension and bridge pipes. These, however, were easy to clear, and the trouble caused was trifling in comparison with what was in store; for in a short time the hydraulic main itself became choked with thick tar and pitch, which blocked up the mouths of the dips, and on several occasions as many as four out of the ten retorts were stopped in this manner. It was anything but pleasant on a winter's evening, when perhaps the full number of retorts at work are required.

In order to clear the main, it was necessary to make a large hole in the retort-house wall to get the end plate taken off, as it was of no use to drive bars down through the dip-pipes. When this was done, the main was found to contain very little liquor, but a mass of pitch and very thick tar, which proved rather difficult to remove, as it stuck so fast to the iron that the chisel-pointed bars used to glance off the hard portion of it. A jet of steam was laid on to it; but this was found to be too slow. Then a couple of strong gas-flames, burning from the ends of a length of pipe, and connected by a flexible tube with the nearest gas supply, were applied to the bottom of the main in different places. This heated the iron so that the pitch loosened, and could be drawn out in large masses by means of a rake.

This clearing of the hydraulic main had to be done every six or seven weeks, until the beds were let down. Then a tar outlet was put on at the end. It was made of 3-inch gun-barrel bends and T's, formed into a trap, with the end projecting through the wall, where it dropped the tar and liquor into a rain-water hopper-head fixed to the wall, from which they were conveyed by a 3-inch pipe to an iron store-tank, where they were separated. This tank serves for filling the barrels; it being raised from the ground on stands. A ¾-inch water supply was then connected to the other end of the main, with a regulating-tap within easy reach of the stokers, and a constant stream of water kept running through it. This keeps the dips and H-pipes cool, and brings away the tar while it is in a soft and thin state. Any stoppage or check in this arrangement can be readily detected, as the tar and liquor can be seen flowing into the hopper from the retort-house door. This, however, has not occurred since it was put on. The whole thing works most satisfactorily; a constant water-seal being maintained, which can be regulated to any required depth.

In conclusion, the writer would remark that the difference still exists between these two hydraulic mains, that the old section at the other side of the house never chokes or collects pitch in the manner described, though the heats have been just as good. But the charges are not quite so heavy; the retorts being somewhat smaller. Then the extra thickness of metal in the old-pattern main seems to keep the tar cooler, and prevents it from forming into pitch, as the heat does not penetrate it so quickly.

Discussion.

The CHAIRMAN said they had listened to an excellent paper by their friend from Tralee. It was very good to see a manager coming such a distance, and giving the Association such an excellent paper. Of course, the gold medal he had gained would not be presented to Mr. Egan till next meeting, as it had to be got ready; but the paper was one on which there might at once be some discussion.

Mr. W. MILLER (Cookstown) asked what sort of coal was in use when the hydraulics were fixed up. Was it the same as was in use before? And what was the thickness of the wall? Frequently the wall was very thin. He had seen 4½ inches; and they knew the heat it had to stand was very great. With walls 9 inches, and even 13½ inches thick, he had occasionally had stopped pipes. He had found one pipe stop when he could not explain why it had done so. There was only one in the whole place which stopped; and the way he cured it was by a little jet of water and dropping some asbestos down it. He let the water enter through a very small orifice—a gas-burner, in fact. He presumed that the author of the paper did not do anything with his gas liquor, because he understood he was sending in ordinary cold water into the main, which would make the liquor valueless. But probably, like himself, he could do nothing with it.

Mr. D. WILLIAMSON (Clones) asked what height the mains were. Were they both the same height? and did he understand from Mr. Egan that the one was a ⅜-inch wrought-iron, and the other a cast-iron pipe?

Mr. EGAN said that, with regard to the coal used, he might mention that, in the beginning of this trouble, it was English coal he was using; but before they had got over it, they had changed to Scotch coal. The trouble was, however, just as bad with it. The sort of coal used did not seem to make any difference. The front walls of the two benches were 9 inches thick. He would not mind very much a few pipes choking; but in his case the hydraulic main was simply blocked up with pitch. That was his trouble. He did not make any use of the liquor from the main. Even if he did lose it, he considered that a desperate case required a desperate remedy; and he was prepared to sacrifice the liquor for the sake of the main, because it was in the midst of the winter time. Those were the principal retorts he had in use at the time. The height of the main was the same in both sections. The main in the old section—the cast-iron one—was much thicker than the new one. It was more troublesome. The old section was circular; the new section was U-shaped.

Mr. MILLER said that the reason he asked about the coal was that just about a year before, he was concerned, in his present works, with a coal from Wigan which was brought in, and it pitched the main in just the same way. The pitch had to be dug out with spades; and he never could find out why it did pitch.

Mr. EGAN: Our difficulty was the same with both kinds of coal.

Mr. T. HANDS (Enniskillen) said he would like to make a remark regarding an experience he had had, as to the pitching of a main. The main was very low; and the arch had been put up perhaps a good many years before. It was only of 4½-inch fire-brick, backed up with 4½ inches of red brick; and it was very poorly filled in. The main pitched up; and they had to dig it out. He put on 9 inches of brick rubble along the wall in front, and filled it in with lime; and as it heated up, the lime ran into the brick rubble. By this means, the hydraulic main was heated up; and he never had any difficult with it afterwards. Want of heat was the trouble with him.

Mr. G. NORMAN (Dublin) said he believed that the pitching of the main was more likely to occur with regenerative furnaces than with the old direct form of firing. At Athlone, where they had Hislop's regenerative furnaces, it took about two days to put things right.

Mr. R. ROSS (Dungannon): But in Athlone the bridge-pipes are outside the roof altogether.

The CHAIRMAN said he had no doubt they had all had their own troubles with pitched mains and choked ascension-pipes; and he did not know if a cure had yet been found for them. Everybody thought his own was the cure. He (Mr. Nesbit) thought, however, it was understood that pitching was caused by an extra strong heat coming off the bench; and in his opinion about the best cure was to keep the hydraulic main pretty high above the brickwork.

The following paper by Mr. C. B. Outon, of Inchicore, Dublin, was, in his absence, read by the Honorary Secretary of the Association, Mr. James Whimster:—

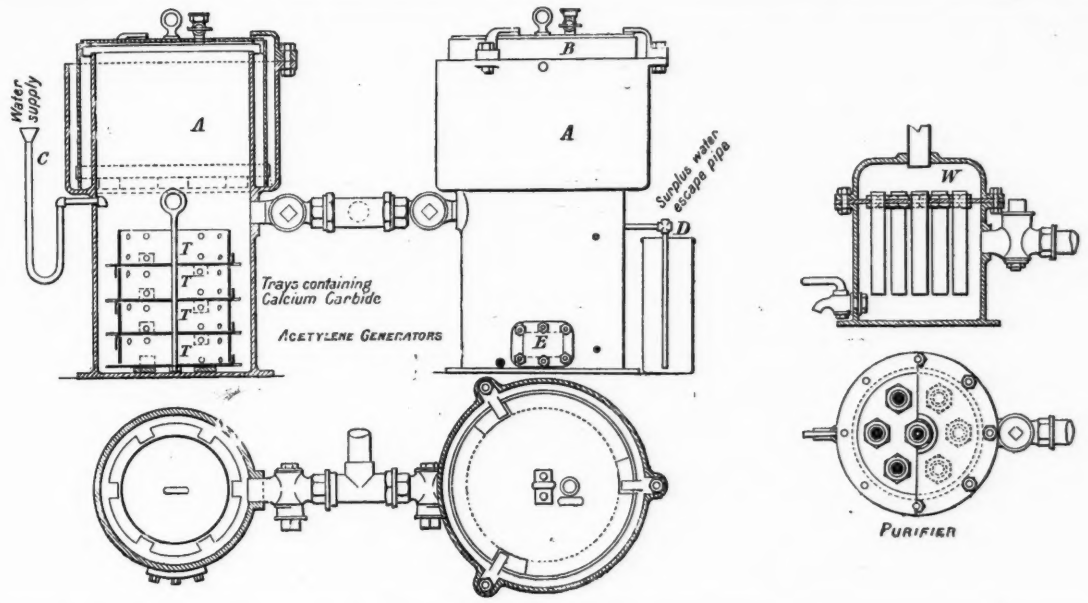
DESCRIPTION OF AN ACETYLENE GAS PLANT.

Many of us doubtless remember an illustration of the production of acetylene from calcium carbide, at the annual meeting held at Drogheda two years ago, by Professor W. I. Macadam, when his audience were delighted with the simplicity of the operation, and the intense brilliancy of the flame produced. The feeling possibly engendered was that the days of coal-gas making were numbered, and that in all probability we should have to change our vocation at no very distant date. This contingency, however, has not happened, inasmuch as subsequent experiences have proved the comparative difficulty of obtaining the carbide in bulk, and even then at anything like a reasonable figure which would be likely to make it a competitor with coal gas. Still, there are many cases of small towns, railway stations, country mansions, and large institutions, &c., where the freight of coal forms an important factor in the manufacture of coal gas; and in such instances there appears to be a wide field for the employment of acetylene. It is with the object of facilitating this that the writer has got out (under the direction of Mr. R. Coey, the Locomotive Superintendent at Inchicore) a simple form of apparatus which has very recently been erected at one of the Great Southern and Western Railway Stations, and the use of which has been attended with every success.

The generator A is made of cast iron, and is provided with the familiar form of water luting of 12 inches seal. A movable wrought-iron circular cover B, secured to the generator by three clamps when the apparatus is working, serves as a ready means for the introduction of fresh carbide. The quantity used is 25 lbs. per charge. The water to effect the decomposition of the carbide is introduced at C; and the rate is governed by a tap. An overflow is provided at D, at a lower level, to take off any water getting into the gas-outlet. The gas passes through a cast-iron washer W, containing a solution of sulphate of copper, for the purpose of removing any trace of phosphoretted hydrogen; after which it is conveyed to a storeholder of ample capacity.

In the construction of this form of apparatus, which is intended to be erected in the open, the contingency of the cast-iron outlet-cock from the generator being shut by inadvertence, when the manufacture of the gas has been started, has been entertained. The enormous comparative volume of the gas would find a ready outlet by the blowing through the large area of the water-seal, and thus prevent the possibility of an explosion occurring by the bursting, under pressure, of the generating vessel. Ordinarily, the pressure does not exceed 1 inch in excess of the sum of the purifier and holder back-pressures.

The calcium carbide is introduced in a series of perforated vertical trays T; the water acting first on the lowest, and so on until the upper one is reached. The pressure evolved is much more uniform than if it acted on the whole mass at once.



The lime sludge is removed by the cleaning-door E, and is run into a large settling-tank. This form of generator has not been provided with an agitator, as it has been found that, when the carbide is previously broken up into lumps of suitable size, the decomposition is complete, and the resulting mass perfectly inert.

The acetylene is consumed with No. "ooooo" burners in back lamps of improved construction, in which the sides and front are formed in one piece of bent glass. This obviates the introduction of the deep shadows which would otherwise be formed if the framework were of metal, owing to the small area and great brilliancy of the flame.

During the past two years, the numerous abstracts of patent specifications in the "JOURNAL OF GAS LIGHTING" bear eloquent testimony to the fact that many minds have been actively engaged in this branch of work; and numerous devices have been designed for the rapid evolution of this gas. The object of the writer is to bring under the notice of his fellow-members another safe form of generator; and he trusts his experience of the production of the new illuminant on a fairly large working scale may prove of some slight service.

Mr. WHIMSTER said that, so far as he could, he would be willing to explain anything. He had not seen the plant. He simply had the paper and plan put into his hands that morning; but he had a description of the plant given him by Mr. Outon himself some time ago.

Mr. W. MILLER (Cookstown) said he would like to know if there was any compensating holder for the rise and fall of the apparatus while the making of gas was going on.

Mr. WHIMSTER explained that the gas was delivered into a holder sufficient to store the gas from 25 lbs. of carbide, which was the full charge.

Mr. MILLER asked how it was proposed to do away with the air already in the apparatus when starting the plant. That had been, they knew, the cause of considerable explosions.

Mr. WHIMSTER said there was a plug in the top of the apparatus; but whether or not that was used for getting the air out, he could not say. Very possibly it might be so used.

Mr. MILLER said they had an "acetylene man" in their town, who made the discovery that the Gas Company's works would be shut up in about twelve months. He started to make gas from calcium carbide; but he never thought of the need there was to get rid of the air in the plant. He made a thing like a tin can; and he did not even put a burner into the pipe. He simply put a lighted match to an opening in the pipe; and the result was that his apparatus was—well, not there. It was fortunate, indeed, for himself, that he escaped injury. Two or three days before the occurrence, he had been saying that everybody would soon have his own gas-works; but afterwards he said he would do nothing further in the matter. He (Mr. Miller) was inclined to think that a great many of the explosions which occurred were not necessarily to be attributed to the acetylene gas, but were the result of people using it who had no knowledge whatever of the nature of the gas, or that a mixture of gas and air in certain proportions would explode. He was inclined to think that the explosions occurred on account of want of knowledge on the part of people using the gas.

Mr. T. LLEWELLYN (Newbridge) asked where the plant which had been described was erected. He presumed it was in his neighbourhood; but he had never seen it.

Mr. WHIMSTER said it was at one of the Great Southern and Western Railway Stations; but if Mr. Llewellyn asked Mr. Outon, he was sure he would let him see it.

Mr. LLEWELLYN asked if Mr. Outon gave any information as to where he got his carbide of calcium.

Mr. WHIMSTER said he did not; but he (Mr. Whimster) thought he bought it in Scotland, and paid £28 per ton for it.

Mr. T. DUNCAN (Glasgow) said he tried to buy carbide of calcium in one or two places in Glasgow; but it was very difficult to get. It was made somewhere about the Falls of Foyers; and the price of it was £45 per ton.

Mr. MILLER said the lowest price he had heard of was 5d. per lb., at which he had bought it himself.

Professor MACADAM—referring to a warning given against the use of impure foreign-made carbide of calcium—said the greatest danger was from the possibility of phosphorus being present in the lime from which the carbide was made. Most English lime contained a proportion of that ingredient. The phosphate in the limestone gave phosphide during the process of reduction; and when water was added to this substance, phosphuretted hydrogen was given off, which was a substance that was spontaneously inflammable. Of course, a very small quantity of phosphuretted hydrogen would inflame a large bulk of acetylene gas. In the matter of the phosphates to be found in English limestones, he must say, some of them were much worse than many of the German mountain limestones. As to the paper just read, it seemed to him that the difficulty with the plant described was that it had so large a space containing air. If they had a mixture of carbide of calcium, containing sulphide of calcium, in such an apparatus, there would be great liability to explosion. They would have the phosphide decomposed more quickly than the carbide, with the result that they would get phosphuretted hydrogen, which was really a "Will o' the wisp," and which would inflame upon contact with the oxygen in the upper stratum of air. There was another danger in these things, in having anything like copper in the fittings, because it formed acetylide of copper, which was highly explosive.

Mr. G. NORMAN (Dublin) pointed out that the 12-inch water lute in the plant was practically a safety-valve.

Mr. WHIMSTER: That is so; it would blow before it would injure the apparatus.

This closed the discussion; and the Chairman intimated that with it the business of the meeting had come to an end.

BRITISH ASSOCIATION OF WATER-WORKS ENGINEERS.

To complete our report of the proceedings at the recent meeting of the above Association, we this week give abstracts of the two papers which claimed the attention of the members at their final sitting.

Mr. J. SHAW (Boston) read a paper, entitled—

NOTES ON DISTRIBUTION.

The author commenced with a description of what he considered to be an ideal service reservoir. It should, he said, be placed on ground high enough to command the district, near the centre of distribution, and contain sufficient water to make up for any irregularity of supply or demand. If in or near the town, or if the supply is a hard spring water, it is imperative that it should be covered, and hold as a minimum one day's supply. Further away from the town, with a softer water, open reservoirs with a capacity of from three to fifteen days' supply would not be regarded as too large.

At some length, he discussed the factors which have to be considered in laying out the distributing-mains. Practice tells the water engineer that sometimes one-fourth of the supply may be required in an hour; therefore, the main must be capable of carrying six times the average if constant supply is to be kept up at these times without the intervention of storage cisterns. Distribution mains are generally made of cast iron, in lengths two yards under 3 inch, three yards under 12-inch, and four yards above that size. On the Continent, the same number of metres are taken as the standard; and as this gives 10 per cent. fewer joints, it is possible that many contracts have been lost to this country by pipe-makers giving foreigners "what we make," instead of "what they require." The spigot and socket joint is generally adopted; but some engineers prefer the old-fashioned joint run with lead, and others the "turned and bored" joint. Pipes, with turned and bored joints, although more costly per ton, can be laid more cheaply than lead joints; but the difficulty of altering direction and level, and allowing for expansion and contraction, would make one hesitate to use them on all occasions. Pipes should be laid with at least 3 feet cover in a levelled trench, taking care that the pipe bears on the bottom of the trench for its whole length, especially in rocky ground. Frost and heat seem to affect pipes at a greater depth in hard ground than in soft. When crossing made ground, it is sometimes advisable to lay the pipes on planking, which should be carried into the solid ground on each side. Bricked culverts are best crossed by carrying the pipe inside another, so as to take the weight of the brickwork off the main; and on bridges it will often be found that the spring of the bridge will draw the joints, especially at the delivery end, where the pipe deviates from a straight line. Hooped rings to prevent the lead working back are sometimes employed; and laying coal-tar asphalte for a few yards under the main, on the solid ground at each end of the bridge, has in some cases formed a perfect cure.

As to the position in the roadway for the water-pipe, preference is given by the author to about 3 feet from the curb, clear of the gutter and the heaviest traffic. The centre of the roadway is generally occupied by the main sewer, from which the water-main cannot be kept too far; and it is also well to keep clear of the gas-main. When in too close proximity, it is sometimes difficult to effect repairs. The author knew of an instance, one where the gas and water mains crossed a bridge side by side; the cover being very shallow. The water-main was lowered at one side of the bridge; and some years after, the gas company laid a new main in duplicate, using the water-main as a saddle to rest their two pipes on. Should a burst occur, the town will be temporarily deprived of its gas supply through the want of thought on the part of the gas engineer. Where gas and water pipes are the same size and on the same side of the road, there is always the danger of the service layers cutting into the wrong pipe. Often, too, when the mains are in actual contact, a sort of electrolysis takes place, in which the water generally gets the worst of it. It is well therefore for gas and water resident engineers to enter into an agreement as to the position of their mains.

The author next spoke of the necessity of avoiding dead-ends. He also advocated the placing of sluice-valves on the trunk main at least every mile; and the fixing of scour-valves at every depression, and self-acting air-valves on every summit. Balanced relief-valves should also be fixed on the pressure side of stop-valves. Where possible, no ferrules should be fixed in the trunk main, although the use of apparatus for tapping under pressure has removed one great objection to this practice. Every sluice-valve should be worked once a month, as the packing, being often "too scientifically" constructed, is apt to work stiff, especially in the larger sizes. Some promising attempts to remedy this defect have been made by means of metallic packing. The author held that fire-hydrants should be fixed every hundred yards; in this case, preference being given to the centre of the roadway, so that at fires only one-half the road need be occupied with the hose. The mains should also be large enough to meet such contingencies.

On the subject of pressure-reducing valves, which are of value on any supply with pressures exceeding 100 feet, he said that, with sound mains and apparatus, pressures above this are seldom required. Where a leak or faulty apparatus does occur with higher pressures, the waste is enormous; the very pressure tending to cause waste on self-acting valves, which would otherwise remain in good order. The ordinary cheap equilibrium ball valve, when running full bore, will not shut with a pressure of 300 feet; and the introduction of a pressure-reducing valve will prevent both bursting and waste. On one main in a chalk district where leakage was known to exist, the reduction of pressure from 150 feet to 50 feet reduced the night consumption to two-fifths. At Maidstone, where the lower parts of the town are supplied generally from two sets of springs by gravitation, the Water Engineer (Mr. W. J. Ware) has applied pressure-reducers in a most ingenious manner. The water, normally at about 80 feet pressure, is sometimes required to supply or make up a deficiency in a high-level district. Under the conditions of gravitation supply, the water from one set of springs passes the pumping-station by a bye-pass, fitted with a retention valve, into the low-level district; but, when high service is required, the water is taken from the main under pressure, and given a final "kick" up into the high-level main. By introducing pressure-reducers on the low-level supply-mains leading from this trunk, the ordinary pressure is kept on the low-level district; and the other set of gravitation springs is utilized for supply when the engines are at work. The Company thus save the expense of a separate pumping-main.

In making connections, the author preferred to use a bent ferrule, with coupling screwed into the top of the main. He also referred to the convenience of having a stop-cock protected by a movable cover fixed on every service, just outside the consumer's premises.

Mr. W. COLES FINCH (Chatham) contributed the final paper on

ELECTRICAL WATER-LEVEL RECORDERS.

The author has had charge of one of these instruments at the Rochester and Strood Water-Works for upwards of three years. It is the invention of Messrs. Barr and M'Whirter, of Glasgow, and is designed to indicate and record the fluctuations of water-level in a reservoir at a distance from the pumping-station. It consists of a transmitting instrument placed over the reservoir, and acted upon by a float; and a receiving instrument with dial clock and drum, placed in the engine-room or engineer's office. The two instruments may be connected by a single line wire, carried either on poles or laid underground.

The transmitter instrument is constructed as follows: On the horizontal shaft are two pulleys, on which are wound phosphor-bronze cords—one carrying a copper float, which rises and falls with the water-level; the other, carrying a balance-weight to counterbalance the weight of the float. Motion is thus communicated by means of tooth-wheel gearing of brass to the tumbling-arm, which arm makes one revolution for each inch or more, as the case may be, of rise or fall of the float. In falling over after it has passed its upper centre of gravity, this arm acts upon one or other of the two side levers; thus making an electrical contact, and so indicating either a rise or fall on the receiver at the pumping-station. The tumbling-arm is weighted with a tube filled with mercury, which brings it down very sharply the moment it has passed its centre. The contacts, which are in duplicate, are of platinum, and have a rubbing or sliding motion, to ensure their being kept clean. The moving parts are on dead centres, so as to secure the minimum amount of friction.

The receiving instrument receives the current sent from the transmitter at the reservoir, and, by means of a relay and local battery, is made to act upon the one or the other (according to rise or fall) of the two pairs of magnetic coils, attracting one of the pendulous arms, each of which carries a keeper. When the arm is pulled over by the magnetic coil, the pinion on the main shaft is made to revolve to the extent of one tooth, and only one; a locking-bar preventing any further movement. When the current is released, the pendulous arm swings back by gravity to its normal position. A wheel geared to the main shaft carries an index pointer on its shaft, and indicates the level of the water on the dial. Vertical motion is given to the pen marking on the diagram by a light wire cord. The drum carrying the diagram makes one revolution in 24 hours, or in one week, as may be desired. The drum with the diagram is driven by a strong 8-day or 30-hour pendulum clock.

The first use of this instrument is as a guide to the engineer at the pumping-station, whereby he can see at a glance the result of the pumping, and can arrange his work accordingly. It is also a check on the pumping records and time sheets. It will also show if there has been any pumping to waste, through pumping having continued after the reservoir was full. The recorder has also been found to be of great service in assisting to locate as well as detect waste; and in Strood, the consumption of water has been reduced 40 per cent. by its use.

In the case of the Strood Water-Works, where the low-sevice reservoir is close to the engine-house, and the high-service reservoir at a distance, the author designed and fitted a mechanical arrangement of float, shafting, and gearing to record, on the same diagram as the electrical apparatus of the high-service reservoir, the levels of water in the low-service reservoir, which shows the electrical records in steps, and the mechanical records in a continuous line. This system could also be employed in recording the fluctuations of water in wells.

Describing the system adopted in locating waste, the author said the area supplied is divided into sub-districts. One district is shut off each night, and the effect on the reservoir noted; and then the most wasteful districts are subjected to a systematic house-to-house inspection. The engineer can thus place all his inspectors in the districts shown to be wasteful, and save the labour of examining districts which are in a satisfactory condition. Where there are two districts and reservoirs one sub-district in each may be shut off the same night. Underground leakage may be traced in the same manner; and a remarkable instance of this kind recently came under the author's notice. There was an excessive waste of water; and district after district was shut off for a night, and failed to show any abnormal waste. Ultimately, when the whole town was shut off, and the loss still continued, it became apparent that the leak was at or near the reservoir; and it was eventually found to be in the wash-out valve of the reservoir, and within 30 yards of the recording instrument. In 1895, the Rochester Corporation discussed the question of adopting the waste-meter system; but after collecting information from other towns as to the result of the system, they finally decided not to adopt it, as they considered the result of the careful following up of the electrical recorder diagrams was quite as satisfactory; the consumption having been reduced from 36 gallons per head per day in 1891 to 17·58 gallons in 1895.

The author exhibited several diagrams, one of which is from a splendid instrument made to his requirements, and recently fixed at the Luton works of the Brompton, Chatham, Gillingham, and Rochester Water Company, and is designed to record the water-level in a reservoir 21 feet deep and 2½ million gallons capacity at a distance of about one-third of a mile from the pumping-station, and also to record on the same diagram the water-levels in the well, which vary to the extent of 84 feet; the reservoir levels being marked in black, and the well levels in red ink. This arrangement is most useful; the condition of both well and reservoir being seen at a glance at any moment of the day or night. This is the more valuable in cases where the demand runs very close to the yield of the springs; and it is also very valuable in testing the yield of springs, and ascertaining the quantity of water that can be drawn from the wells. With the assistance of this instrument, and by making a few trials, it can easily be found at what speed to run to extract the largest amount of water from the well. This is of great value, and is more economical than pumping down quickly, and waiting for underground storage to refill; and in most cases more water will be obtained. The diagram is also a permanent record of the variations of the depth of the water in the well caused by dry seasons in succession, heavy pumping, or wet seasons, as the case may be. It is also a faithful record of the rate at which the well and headings refill under different conditions; and, again, when extensions have been made in headings or underground storage, by making a few trials before commencing, and again after the completion, an accurate record can be obtained of the value, delivery, storage, &c., resulting from the extension.

The papers were discussed together; and the following is an outline of the various speakers' remarks.

Mr. C. Gilby (Bath), calling attention to the statement in Mr. Shaw's paper that "practice tells us that sometimes one-fourth of the supply may be required in an hour," said, in his own case, he found the maximum consumption in an hour never exceeded from four to five times the minimum. The average consumption per hour was about three-fourths of the maximum; and the minimum was invariably less than one-fourth. The author recommended that pipes should be laid with at least 3 feet cover. That was a wise precaution. But what would he do in the case of Bath, where nearly all the streets were constructed on arches; and in places it was utterly impossible to get more than 3 inches of cover? He fancied Bath was unique in this respect. It was, he believed, an almost universal experience that frost penetrated much more in hard than soft ground. Pressure reducing valves were all very well; but it was quite impossible for him to fix them on his trunk mains as he had to supply water to houses situated on both sides of a rather steep valley.

Mr. W. Matthews (Southampton) disagreed with Mr. Shaw as to fire hydrants being fixed in the centre of the roadway. Not only was the box liable to damage by heavy traffic, but difficulties were perpetually arising by the wearing away and repairing of the road. He preferred them in the foot-paths. As to Mr. Finch's paper, the recorder seemed to have been worked out somewhat on the general principle of the Silvertown apparatus. The principal trouble experienced with these recorders in the past had been the action of the pens. The author had spoken of the use of the apparatus in detecting and locating waste. It had been useful where Mr. Finch used it; but he (Mr. Matthews) did not think it would be possible to apply the system to any but comparatively small works. It could only be applicable in cases where the consumption of water did not vary much from day to day; and therefore any undue consumption in a given district would have a strongly marked effect on the amount of water in the reservoir. In large towns with manufacturing supplies, the variation from time to time would entirely obliterate the indications of the recorder when used for this particular purpose.

Mr. W. Whitaker, F.R.S., F.G.S., ventured to suggest that water engineers should encourage the fixing of stop-cocks by consumers and builders inside houses, as this would prevent the bursting of pipes and wasting water. He had had one fixed, and found it of great advantage.

Mr. R. Macintyre (London) wished to supplement the reference which had been made to the Silvertown indicator, with which he had something to do when Mr. George Robinson was carrying out the Leamington Water-Works close on twenty years ago. The idea was Mr. Robinson's; and he (the speaker), who was then with the Silvertown Telegraph Works Company, was sent down to Leamington. He went over the ground from the reservoir to the engine-house; and then worked out the idea, and the indicator was made. The identical ideas embodied in the instrument were amplified in the apparatus brought before them by Mr. Finch; but, unfortunately, the sum of money which the Leamington people were prepared to pay, did not enable the makers to carry out the arrangement to the extent he had in his mind at the time. He did not wish to detract from the merits of the apparatus described in the paper. As an engineer, he considered it an important invention for water-works. He was surprised that such an instrument was not more generally used.

Mr. H. Francis (Devonport), referring to Mr. Shaw's recommendation to keep water-pipes clear of those conveying gas, said he remembered a circumstance bearing upon this point which happened in a town where there was an intermittent service of water. A report was made to the water office that there was a smell of gas in a certain house every time the water was turned off. He investigated the complaint; and, on applying a light to the water-tap, he had a gas-jet about 18 inches in length. He found the gas and water services had been laid in the same trench, and that the former had become defective, and the latter had burst. On shutting off the water, gas passed into the water-service; and when the water was again turned on, the gas was driven out of the tap.

Mr. C. E. Jones (Leyton) said, in these days of traction engines and other heavy weights passing over roads which were not made to carry them, a greater depth than in bygone days was found necessary for gas and water pipes. It was awkward carrying pipes over railway bridges made with girders, with no room to get a sufficient covering. Quite recently he had had some experience on this point at Chesterfield. Although it was held by the lawyers that the common law gave ample protection, he was certainly of opinion that it was desirable a clause should be put in every Railway Act protecting the interests of both gas and water authorities. As to the circumstance mentioned by Mr. Francis in which the supplies of gas and water got intermingled, it appeared that the former, instead of being a delinquent, enabled him to find out that he had a defective water-service. He spoke of the necessity for increased supervision over gas and water in these days when the speculating builder was allowed to run rampant throughout the land, and stated that he resolutely set his face against either gas or water pipes being laid in the same trenches or trenches for any other purpose. As to the situation of stop-cocks, general experience showed that the best position was outside the house; but if a tenant wished to put in a stop-tap for his own convenience, he did not think any water authority would object to it. For the sake of accessibility, fire hydrants should be placed in the foot-way.

Mr. F. J. Bancroft (Hull) corroborated what Mr. Jones said

respecting stop-cocks. Where a service-pipe supplied more than one premises, there was no objection whatever to a consumer having an inside stop-tap; but, in the case of such service-pipe, a stop-cock should not be under the control of one tenant to the detriment of the others. Several of the disadvantages that had been mentioned respecting water-mains might be obviated by keeping the roadway entirely for the leading mains, and laying service mains in all cases under the foot-ways each side of the road. In Hull, there were few stop-cocks; and they had used the fire hydrants with great benefit for detecting waste.

Mr. C. H. PRIESTLEY mentioned that at Cardiff houses of a rental of £30 were usually provided by the builders with inside stop-cocks as well as those outside. Mr. Shaw had spoken of the advisability, when crossing made ground, of laying the pipes on planking; but he (Mr. Priestley) thought that, in certain kinds of grounds, he would find the planks would soon rot. It was his (Mr. Priestley's) usual practice to use concrete blocks in the case mentioned.

Mr. D. CAMERON (Exeter) noticed that Mr. Shaw suggested the placing of fire hydrants 100 yards apart. In a densely populated district, that was far too wide; and, in his opinion, they should not be more than 100 feet distant from each other. The most convenient place for the hydrants was undoubtedly in the foot-path. Every house should be commanded by a stop-cock, which should be placed as close to the wall of the premises as possible. He thought that, as a rule, house services were far too large for the work they had to do.

Mr. W. G. PEIRCE stated that every house in Richmond was now compelled to have an independent service. He believed it was the almost universal opinion that consumers should have a stop-cock inside the house as well as the one outside; but the difficulty was to get the consumers or landlords to fix them. At Richmond, the fire hydrants were placed 80 yards apart in the foot-ways. Turned and bored joints were admirable where there was solid ground to place them in. For instance, clay cracked; and it was therefore unadvisable to use them in clay. His Committee had recommended that no pipes should be laid of less than 4 inches diameter. As to services, with a pressure of 60 lbs. per square inch, he found ½-inch pipes were ample; and in the high part of the district, where the pressure was reduced to 40 lbs., he put in ¾-inch.

Mr. FINCH remarked that in his district they always laid the water-mains at the side of the road and the gas and sewers took the centre. In regard to hydrants he placed them a foot from the channels at the side of the road; so that, when they were blown out, the water would trickle down the channels.

The PRESIDENT (Mr. H. Ashton Hill) said his practice was to lay mains 2 ft. 6 in. to the top of the body. In fixing upon this depth, he consulted the Surveyor to one of the County Councils, who expressed himself satisfied with this depth, and agreed to make good any damage consequent on the use of steam-rollers. As to the position of stop-cocks, he always fixed them as near the boundary wall of the premises as possible, or in a passage. Regarding electrical recorders, there were several in the market; but they were complicated and costly. He invited tenders for one some time ago, but found it so expensive that he set about having one made, and the cost was much less.

Mr. SHAW, in reply, said, if water authorities would go to the expense of having a main on each side of the roadway, then the proper position for fire hydrants would be on the pavement; but he had found difficulties where a fire happened immediately opposite a fire hydrant so situated. As to Mr. Francis's instance of gas finding its way into a water-pipe where there was an intermittent supply, all he could say was that no water-works were complete without a constant service; and the water engineer had no right to have leaky pipes. He was not a great believer in using concrete as a support for pipes, as it was very expensive; and he found that wood lasted a long time. Respecting the depth of pipes, he had known frost to penetrate 3 feet. It was his opinion that iron pipes actually attracted the cold; and this was borne out by some tests he had made with thermometers.

The authors were thanked for their interesting contributions to the proceedings.

Electricity v. Gas for Lighthouse Illumination.—In the course of a review of lighthouse progress during the past ten years which recently appeared in "Nature," Mr. J. Kenward dealt with the various illuminants employed in the lighting of our coasts. He expressed the opinion that the maximum intensity of illumination is to be found in the electric arc; but the light is very sensitive to atmospheric conditions, and in thick weather it parts with its power in a much greater ratio than does a gas or even an oil light. There is a degree of fog which quenches the sun; while the large luminous surfaces of the superposed gas lenses project on the fog a reddish coloration, and the fog itself thus becomes a signal to the mariner. It would, however, be most dangerous for him to approach the coast presuming on this quality of a light in the vicinity of which he supposed himself to be. Mr. Kenward referred to Mr. J. R. Wigham's well-known arrangement for the superposition of lens lights, each with its own gas-burner, as an obvious means of gaining power; and he cited the triform Tory Island light, fitted with these burners, and variable in power from 17,500 to 326,500 candles, as an illustration.

REGISTER OF PATENTS.

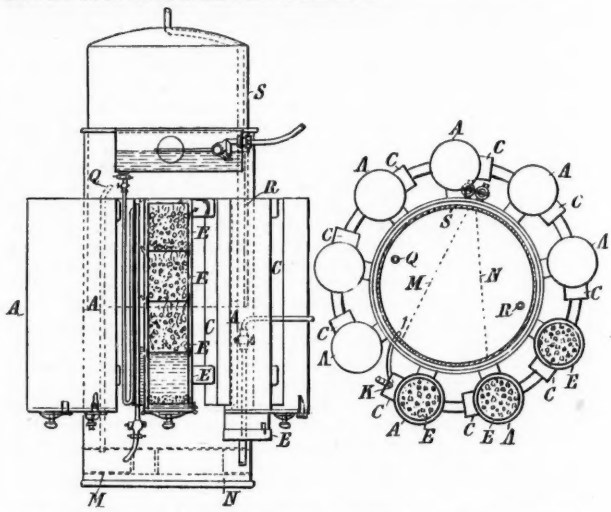
Generation and Storage of Acetylene.—Bowers, A. F., of Paris. No. 13,511; June 18, 1896.

The features of novelty in this arrangement of acetylene gas machines—of the type in which the generation of the gas is regulated by pressure upon a column of water in communication with the water reservoir—are: (1) A regulating chamber into which the extremities of the water supply pipes of each of the generators or holders constituting the plant project to varying degrees; so that as the water-level rises, owing to depressed pressure of gas, the succeeding generator or holder is set in operation. (2) Provision of a return bye-pass pipe from the carbide holder to the water reservoir; so that, in the event of excessive pressure being attained even after the water supply is cut off, the remaining water is returned to the top of the water reservoir.

Acetylene Gas Generator.—Duffield, M., of Slough. No. 17,646; Aug. 10, 1896.

The main feature of this invention is that a divided generator is used and no valves—the gas never being above "burning pressure."

The illustration shows a sectional elevation and plan (partly in section) of one entire generating chamber. It consists of enclosed vertical cylinders A; one end (preferably the bottom) having a removable air-tight lid fastened in front by a lever and catch. At the side of the generating chambers is another chamber C for containing the water which feeds the charge of carbide in the generators. The chambers A are preferably connected together in series; each series requiring only one water-supply box. Lateral channels or pipes are provided to pass the water and gas forward when the entire charge of carbide in one chamber is exhausted. Thus the water can flow on through the channels to the bottom of the next chamber, and, percolating through the holes in its sides, start the carbide in the bottom cell therein in action, and so on until the whole series of chambers is exhausted.



As is well known, if a little water be admitted to a large quantity of calcium carbide, it acts and reacts more or less upon the whole quantity; for, the part which is entirely exhausted contains water which acts slowly on the unexhausted portion above it. The affinity of the carbide for moisture is so great that, even though not in actual contact with water, gas is generated, to some extent, if water be present; and further, the gas itself contains enough moisture to re-act on the carbide in contact with it. Therefore instead of simply filling up the generators with carbide, as usual, the patentee proposes to provide each generating chamber with a number of separate, detached perforated cells or receptacles E, in each of which is placed some dry carbide. The cells are inserted from the bottom of the chamber; and the exhausted cells removed for re-charging and cleaning. The opening to the generating chambers being at the bottom, allows water and sediment to flow, by gravity, freely out at the time of re-charging.

The water-supply apparatus consists of the usual tank connected with the main; the inlet-valve being controlled by a ball-float. A pipe, fitted with stop-tap and syphon, establishes connection between the water supply and the generator, and yet prevents any sudden pressure of gas forcing the water back. The supply of water is governed by the rise and fall of the gasholder S. It passes into the water-box C, thence through holes in the side and perforations in the sides of the cells E to the carbide within. A pipe K, inside the box C, carried above the water-level as shown, conveys the gas from the generator to the condensing chamber M, whence it passes through to the holders.

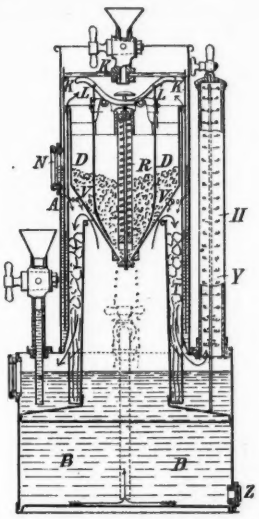
To meet Fire Insurance Companies' requirements, another pipe L, extending nearly to the bottom of the holder, and terminating with a union at top, so that a length of tube can be fixed and carried through the roof of the building in which the apparatus is placed, is provided to convey into the open air any overplus of gas that might be generated beyond that which the holder is capable of storing.

The holder is of the ordinary bell type and weighted both on the bottom edge of its dome, and also by a suspending weight, which weight, however, instead of being all in one piece as is usual, is divided into several parts connected together by short lengths of chain. The weight is preferably hung from the centre of the dome inside at the end of a long chain, and extends below the bottom edge of the dome so that, on the descent of the latter, the weight reaches the floor of the holder first.

Beneath the holder are two condensing chambers M N, at the entrance and exit respectively of the gas to and from the holder through pipes Q and R respectively, which spring from the condensing chambers and extend upwards above the water-level in the holder into the dome.

Generating Acetylene Gas.—Lake, H. H.; a communication from O. Grenier and J. Grand, of Lyons, France. No. 17,904; Aug. 12, 1896.

This arrangement of apparatus is characterized by the fact that the acetylene produced is prepared from grains or particles of calcium carbide, of from one to two millimetres in size, automatically distributed within the apparatus, and connected with it by water seals only—such hydraulic arrangement allowing of the withdrawal of the mechanism, when required, without it being necessary to undo any connection or attachment in order to take out the bell or dome K or the distributor D, while the receiver A and the reservoir B remain open, "so as to facilitate their being examined or cleansed in case of need and replaced in a few seconds, in order that the action of the acetylene producer may again proceed immediately."



The invention bears especially upon the form (shown in the engraving) and relative dimensions given to the acetylene producer; upon the pulverization of the calcium carburet to the form of grains of a size for rational distribution; upon the form and the arrangement of the distributor D placed in the acetylene producer and watched from the exterior through glasses placed upon the bell K of the holder; upon the arrangement of the holder composed of a vessel A and bell K, wherein glasses N are provided for the inspection of the level of the liquid in the vessel, and for the operation of the distributor D in the interior of the apparatus; upon the absolute independence of the bell V performing the part of a safety-valve; upon the arrangement of the levers L and springs R of the distributor D forming with the bell K a system in suspension and in movement like a precision-balance, and ensuring the absolute regulation of the pressure of the gas at the burners; upon the reservoir of decomposition water, which, in view of its independence of position, may be as large as desired to prevent any heating in the production of acetylene gas; upon the washer T placed in the interior of the acetylene produced, compelling the gas to descend, and ensuring its distribution throughout the extent of the annular section, and upon the employment of sponges and iron turnings for retaining obstructions, and microscopic tubes ensuring the washing and purification of the materials carried away by the acetylene; upon the mode of feeding the carburet in motion, without introducing air by distributing-cocks placed upon the bell of the holder; upon the continuous mode of distribution of the water into the reservoir for the decomposition of the carburet, and upon the corresponding extraction of the soiled water during the operation of the apparatus; upon the mode of drying H of the gas by sponges, strips of glass, calcium carburet, and various pierced membranes; upon the possible and immediate removableness of all the parts which are connected only by hydraulic joints, so that without any attachment or joint it is possible to remove the bell K, the distributor D, the washer T, and thus the vessel A and the reservoir B are open for inspection and cleaning, and in a few seconds put back in place.

Separation of Rare Earths for Use in Incandescent Gas Lighting.—Kosmann, B., of Berlin. No. 18,915; Aug. 26, 1896.

This process for obtaining a new earthy oxide (kosmia) from monazite sand and other cerite minerals, consists in first fractionally precipitating the hydrates of cerium, didymium, and lanthanum by adding peroxide of hydrogen and ammonia so that the solution retains an acid reaction; then treating the filtered off solution with the same reagents, but adding so much ammonia that the solution becomes alkaline; separating the precipitate thus obtained from the liquor; dissolving the precipitate in nitric acid; treating the solution in the hot state with oxalic acid; washing the precipitate with hot acidulated water; decomposing the washed oxalate by heat; dissolving the residue in nitric acid; treating the solution with hydric peroxide and ammonia, so that the solution retains an acid reaction; separating the precipitate from the liquor; and adding ammonia in excess, whereby the hydrate of the new earthy oxide is obtained as a whitish precipitate.

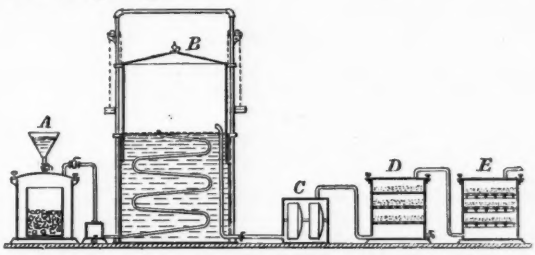
The new earth has, it is said, proved to be a substance "most advantageously applicable for the production of incandescent bodies, effected by impregnating a fabric of appropriate shape with solutions of its salts (nitrate, sulphate, acetate) and calcining." Oxide of kosmium, when used separately, produces a (chocolate) brown coloured mantle, which emits an intense reddish yellow light. A still more intense radiation of light, is, however, produced when the new earth is combined with other rare earths. The combinations of oxide of kosmium with oxide of thorium, oxide of kosmium, oxide of thorium, and oxide of cerium—in which combinations the addition of oxide of kosmium may amount to from 10 to 30 per cent.—yield a white, yellowish light of great intensity and of considerable radiating capacity. The mantle, it is claimed, proves to be of a greater elasticity and resistance against external influences than mantles manufactured with oxide of thorium. The radiating and light emitting capacity increase with the time of burning, and in the same proportion the earths combined by the impregnating process frit together. Moreover the combinations of (1) oxide of kosmium and oxide of zirconium, (2) oxide of kosmium, oxide of zirconium, and protoxide of barium, (3) oxide of kosmium and magnesia—yield "an efficient incandescent body of white or amethyst coloured light, the intensity of which is dependent on the amount of salts used. The quantity of oxide of kosmium may be raised to one-half that of the salts dissolved in the fluid."

The Carburetting of Air or Gas.—Kremer, G., of Gilly, Belgium.—No. 19,953; Sept. 9, 1896.

This is a method of producing "by the cold process" gas for lighting and motive power in which petroleum or other liquid rich in carburets is brought into a state of fine division by the action of air under pressure, and the carburets of the liquid are taken up and intimately mixed with air, and the gas dried. The apparatus consists of two or more carburetting chambers intercommunicating by atomizing devices, which cause the air and the liquid under pressure to be simultaneously broken up into minute particles and the air impregnated with carburets derived from the liquid. One or more cones and surfaces of wire gauze or the like, so as to form baffles or obstacles, are arranged above the carburetting chambers and across the directions of flow of the uprising humid gas, in order to effect the separation and condensation of the entrained liquid and the intimate mixing of the gas particles.

Production and Treatment of Acetylene.—Oving, H. E., of Rotterdam. No. 23,669; Oct. 24, 1896.

The apparatus forming the object of this invention is designed for mixing acetylene gas with atmospheric air, in the necessary proportion to enable the whole of its carbon to be completely consumed. The chief object is to mix the acetylene with atmospheric air in such proportion as to obtain a gas, the amount of carbon in which corresponds exactly to the amount required for the purpose for which it is to be used; and it is found that the best plan to effect this object is to interpose the device for regulating the proportion of mixture in the apparatus for the production of the acetylene gas.



A is the acetylene generator, consisting of an external tank or casing, on which is mounted a funnel regulated by a cock. Under the funnel is a cup or receptacle containing calcium carbide, on which—automatically, or otherwise—fall drops of water from the funnel, and so generate the gas which escapes through a tube and syphon in which the first condensation of steam or water vapour takes place, coming chiefly from a coil placed in the water space of the gasholder B. This cools the gas entering its bell, which is so balanced as to exercise on the gas a constant pressure, under which it escapes and enters the apparatus C for mixing air with the gas, and at the same time regulating the proportions of the mixture.

This device consists of an outer tank or chamber, in the horizontal axis of which is arranged a shaft, supported on pivots, and carrying two or more inner drums of sheet-zinc dipping partly into water, and provided inside with helical blades. A nozzle enters each of the drums in front of the first blade, one of which nozzles serves for introducing acetylene gas, and the other for introducing atmospheric air. The nozzles thus determine the proportion in which air and gas are mixed, which mixing takes place on the escape of each of these elements from its drum into the free space of the tank in accordance with the effect to be attained.

The gas is next led into a purifier D, consisting of a metal tank or chamber, in which are arranged one over the other several perforated sheet metal plates or trays, containing pumice-stone or washed coke, saturated with a solution of lead salts, through which the gases pass successively and become dried and freed from their sulphurous combinations. They then enter another chamber E (to ensure the complete drying of the gas), provided with superposed layers of suitable hygroscopic substances, to which the gas gives up its last traces of water before being led to the burners in an absolutely dry state.

Carburetted Water Gas Apparatus.—Addicks, W. R., of Boston, U.S.A. No. 1398; Jan. 19, 1897.

The lengthy specification of this invention is not capable of being abstracted apart from the three sheets of detail drawings accompanying it. Some extracts from the patentee's introductory remarks will, however, indicate the scope of his proposals.

He points out that, in the manufacture of carburetted water gas as now commonly practised, a bed of coal is heated to incandescence in a generator or producer, which is usually effected by a blast of air forced through the coal; the gases or products of combustion passing from the generator into a structure containing fire-brick or other refractory material, and from which the gases pass into and through a superheater also containing fire-brick. The products of combustion generated in bringing the coal to incandescence, are now commonly called "waste gases," and are permitted to pass from the superheater directly to the stack or chimney. The waste gases are supplied with air in the carburettor and superheater, so as to obtain more perfect combustion of the gases which heat the refractory material in the carburettor and superheater to a high temperature.

When raised to a sufficiently high heat, the air blast is cut off, and steam is admitted into the generator, where it combines with the carbon of the incandescent coal and forms water gas. The water gas is enriched with carbonaceous gases, obtained by admitting oils directly into the highly heated carburettor, wherein the carburetted water gas is wholly or partially fixed or rendered permanent; and the portion of the gas which is not fixed in the carburettor is rendered permanent in the superheater. The highly heated carburetted water gas usually passes from the superheater to the hydraulic main or water seal, where the gas, at substantially the temperature it possesses when it leaves the superheater, meets the cooler body of water in the hydraulic main or seal, which imparts a shock to the carburetted water gas.

This process is defective and objectionable, the patentee continues, owing to the fact that the oil for enriching the water gas, first meets, and is mingled with, the water gas in the highly heated carburettor, which prevents a perfect union of the oil and water gas, and causes the formation and deposition of lamp black and tarry matters, thus reducing the illuminating power of the gas, and rapidily clogging up the apparatus. Furthermore, the sudden cooling of the gas in the hydraulic main produces more or less condensation, which is objectionable for reasons well-known to gas manufacturers.

The present invention is directed mainly to overcoming these defects; and the proposal is to subject the water gas to heat by gradual progressive and retrograde steps from the formation of the gas to the point at which it is fixed; and to then reduce it in temperature by gradual steps from the point of fixation to the discharge from the apparatus, whereby shocks to the carburetted gas are avoided. By subjecting the carburetted water gas to these gradually progressive and retrograde temperatures, and then to a reducing temperature, a carburetted gas of superior quality may, it is claimed, be obtained at a minimum expense with either heavy or light oils; at the same time avoiding the destructive action of high temperatures upon parts of the apparatus, and also obviating the disagreeable effect of overheated tarry matters.

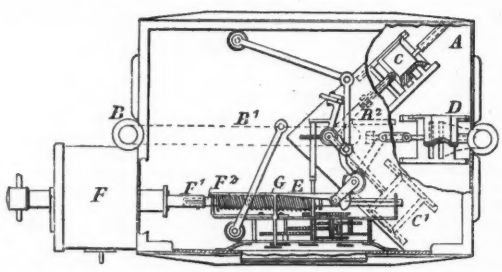
The gradual heating of the carburetted gas is effected primarily by means of a chamber, in which the mixing of the water gas and hydrocarbons is effected previous to the application of extraneous heat; and secondly by means of a moderately heated chamber, into which flows the mixture of water gas and hydrocarbons, and from which the mixture passes to the fixing chamber.

The reduction of the heat of the carburetted gas, after being fixed, is accomplished by passing the gas through a boiler, and preferably also through a feed-water heater, connected to the boiler and to an auxiliary boiler. The feed-water heater is provided with an auxiliary gas outlet normally closed by a valve; and, if desired, the boiler above referred to may also be provided with an auxiliary outlet similarly closed.

These and other features of the invention are pointed out in a specification extending to 11 pages, and ending with 15 distinct claims.

Prepayment Gas-Meters.—Bromhead, S. S.; a communication from F. E. Morgan, of New Haven, U.S.A. No. 8253; March 31, 1897.

As indicated in the engraving, this invention consists mainly in a valve or cut-off, which so acts in conjunction with the gas passages of the meter and the construction of the supply controlling mechanism that the power of the meter may be practically employed for shutting off the gas automatically at the time of complete delivery of the quantity of gas purchased. The top of the meter-casing is removed, and a portion of the top of the valve chamber broken away; dotted lines showing the passages to the inner bellows or diaphragm chamber, as well as the gas passage beneath the floor of the meter and the so-called "frog" chamber—the chamber to which the gas is admitted from the bellows chambers, and from which it passes to the eduction pipe.

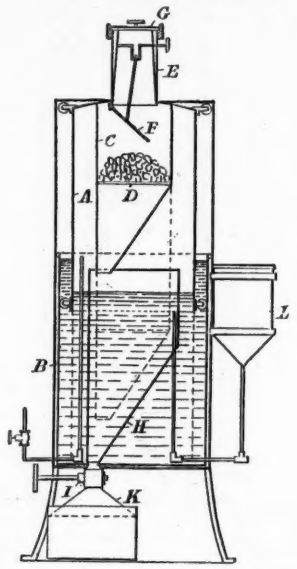


A is the valve chamber of the meter, to which gas is admitted through the inlet pipes or passages B, B^1, and port B^2; the latter being formed in the floor of the meter. In the chamber A are three slide valves C, C^1, and D. The former are alternately reciprocated continuously while the meter is in operation by a crank on a vertical worm shaft revolved by the flag arms attached to the crank. The valve D is reciprocated by the supply controlling mechanism. This mechanism is of the reciprocating type provided with a cam for opening the valve D, and with an arm or lug for closing the valve when the supply purchased has been consumed. F is the coin-controlled purchasing apparatus described in patent No. 2978 of 1895. Its shaft F^1 is connected to the spline shaft F^2 of the supply controlling mechanism E, and both can be turned in one direction only by the handle through a given space at each operation upon the introduction of a coin into the slot of the coin-controlled apparatus.

Upon the shaft F^2 is placed a worm, which engages with the teeth of a small gear wheel keyed on the same shaft with another small gear wheel. The latter gear wheel meshes with another wheel on the inner end of the thousand-foot shaft of the usual meter index mechanism, and locks the other gear wheels from backward movement. Thus when the shaft F^2 and the worm are revolved by the purchaser of gas after the introduction of a coin, the worm is caused to slide on the shaft a given distance for each coin inserted; and this movement prescribes the amount of gas to be delivered through the meter in exchange for the coin. The amount is indicated by a pointer carried by an arm attached to a frame G, and moved by the worm on the shaft F^2. When gas is flowing through the meter, and the two-foot shaft is revolved, the slow revolution of the thousand-foot shaft causes the latter to re-act on the worm, and slide it and the frame G back along the shaft F^2. As the movement of the frame is comparatively slow, the valve D will operate to cut off the gas gradually so as to allow a renewed purchase of gas to be made before the lights are put out.

Developing Acetylene Gas.—Thompson, W. P.; a communication from the Deutche Acetylengas-Gesellschaft mit Beschränkter Haftung, of Berlin. No. 10,199; April 23, 1897.

In this apparatus, the carbide charge is located within, or in such connection with, a rising and descending gas-bell, that by the descent of the bell, when the stock of gas is reduced, the carbide will be immersed in the water; while when it rises, on the stock of gas increasing, the carbide will be lifted out of the water, so as to stop or reduce the further development of gas according to the rate of delivery going on.



To the top of the bell A, inside, a container C is secured, the lower part of which is preferably funnel-shaped. A perforated plate or grate D, is provided within the container, to receive the charge of carbide. Below the container a tank H, of similar shape to the container but of larger size, is placed within the tank B. The tank H contains water, as well as the tank B; but the two tanks do not communicate with each other. The water in B may contain salt (as usually employed in apparatus for generating acetylene gas), while that in H is free of such addition. The tank H communicates with an outside reservoir L, which serves to fill up the quantity of water contained in H; and the level of water in the tank is thus controlled by adjusting the level existing within the reservoir L.

As the bell A descends, the funnel or container C will be immersed in the water in H; and the water will reach the carbide through the perforated plate or grate D. Gas being developed, the bell will rise again; and the carbide will be lifted out of the water, and the production of gas cease, or be reduced, until the bell descends again. The slime of the carbide will fall through the perforations of the support D, and sink down through the funnel H into a receptacle K placed below the funnel H, and connected to the funnel H by a valve I. On closing this valve, the receptacle K may be replaced by an empty one kept in reserve.

The charge of carbide may be renewed without interrupting the operation of the apparatus, and without loss of gas, by the following device: A funnel or casing E is mounted on the bell A, so as to open into it and into the container C. The funnel has its upper and lower end closed; the cover or lid G being tight. The bottom of this funnel is closed by a flap, F, connected to the crank of a shaft provided with a handle to be turned from the outside. The flap remains closed during the operation; but if a new charge of carbide is to be fed on to the grate D, the cover is removed and the carbide poured into the funnel E, where it rests on the flap F. Then the lid is mounted again; and only when it is in place, the handle is turned to allow the charge of carbide to fall down to the grate D.

Recovery of Benzols from Gases.—Marks, G. C.; a communication from La Compagnie pour la Fabrication Des Compteurs et Materiels d'Usines a Gaz, of Paris. No. 10,577; April 28, 1897.

This invention relates to apparatus for the recovery of benzols from furnace gases or coke-ovens; and it is also applicable for the extraction of any products contained in gases capable of solution in suitable liquids. The appliances employed consist of a series of revolving drums within a series of chambers partly filled with a suitable absorbent or solvent liquid, and causing the gas to be dispersed throughout the oil so as to present a large surface for attack while it pursues a tortuous course through each drum and chamber alternately. A triple action of the solvent liquid or the gas under treatment is secured by the passing of the gas through the revolving drum and buckets—that is, it acts by surface, by convection bubbles or boiling, and by aspersion.

Flash-Lights for Incandescent Burners.—White, C., of Blaenavon, and White, T. H., of Cwmbran, Mon. No. 12,009; May 14, 1897.

This invention is designed to avoid waste of gas caused by the pilot jet continuing alight uselessly while the main supply is on, and to relight same when the burner is extinguished, without requiring a special tap for incandescent and other burners.

Fig. 1 shows one arrangement, with a flexible diaphragm A, which by means of the rod B operates the lever C, which opens and closes alternately the two outlets, N H. Fig. 2 shows another form of flash-light, in which the action of alternately opening and closing the two outlets is effected by means of a float valve.

Fig. 1.

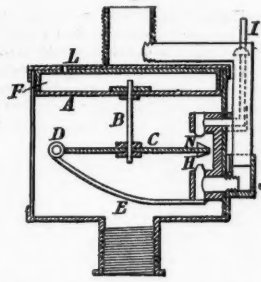
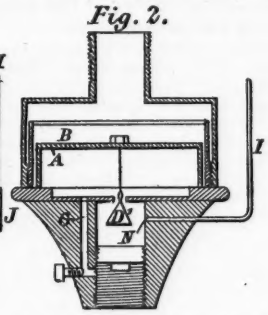


Fig. 2.



In fig. 1, the small lever C is hinged at D, and furnished at its other end with a double seating, which closes alternately the outlets. E is a bracket sustaining the lever C. F is a small chamber (above the diaphragm A) in communication with the external air. H is the outlet to the main burner; and N, to the flash-light. I is the tube to the flash-light; and J, to the main burner. L is an opening to the external air, adjusted by means of a screw, to allow of a gradual escape of air when the main pressure is turned on.

In fig. 2, A is a float valve formed by a small cap with metallic seating; and B, a chamber in which the cap works. D is a bye-pass valve suspended from the cap; and F is a stop plug to divert the gas through the passage G, supplying gas to underside of A. When the gas is turned on, the pressure acting on the cap A and the float valve D or on the flexible diaphragm A in fig. 1, closes the outlet N of the pipe I leading to the flash-light, and opens that to the main burner. This outlet is indicated by H in fig. 1, but is not shown in fig. 2, where it is formed by the lifting of the cap A, the gas flowing under the rim of it. The burner is ignited from the flash-light before it goes out; similarly the flash-light is lit from the main burner before that expires—shortly after the main tap is turned off.

Gas-Burner.—Thompson, W. P.; a communication from D. Ferrari, of Modena, Italy. No. 12,293; May 18, 1897.

This invention is designed to provide a gas-burner "operating with cubic expansion of the gas"—to quote the words of the patentee. He says: "In order to obtain the maximum luminous effect of lighting gas, it is indispensable that it be caused to emerge from the orifices of combustion in very thin streams, in such a way as to give the flame the greatest superficial extension compatible with the unity of volume of the gas emerging in a unit of time. The richer a gas is in carbon, the more

Fig. 1.

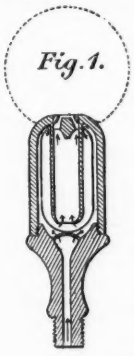


Fig. 2.

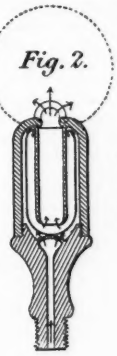


Fig. 3.

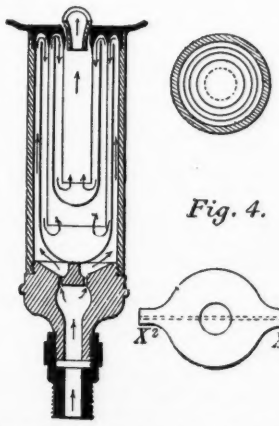
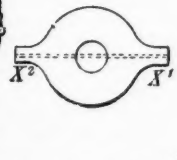


Fig. 4.



indispensable is this condition, in order to obtain a good and perfect combustion, with a maximum luminous effect. For a gas of common richness in carbon, the luminous intensity is proportionate to the surface of the flame; and it does not increase with the thickness of the layer of burning gas. But in employing the mechanical means known hitherto, it was impossible to exceed a certain limit, which has only been exceeded by means of the burner forming the object of the present invention."

This burner is arranged in such a way that, as soon as a flame as thin as possible has been obtained by means of a slotted or perforated burner, the obscure part of the flame comes in contact at the upper part of the burner with a metallic plate in such a manner as to transmit a certain quantity of heat to the gas before it emerges from the combustion orifices. The gas thus heated increases in volume, and consequently becomes lighter; so that the same effect, it is claimed, is produced as would have been obtained by a thinner flame.

In order that the gas may emerge in the most perfect state of rarefaction possible, the burner is formed in the manner shown in preceding figures, in which the gas is forced one or more times in contact with metallic parts heated directly by the obscure part of the flame. Further description of the arrangement af the burners is unnecessary; the arrows sufficiently indicating the passage of the gas, and rendering the construction of the burner intelligible.

Figs. 1 and 2 are vertical sections of a fan burner. Fig. 3 is a similar view of a circular crown burner, in which the gas emerging from the holes A and B heats the upper reservoir C. Fig 4 is a vertical section, cross-section, and plan of a burner with a fan flame, provided with two flanged shoulders in the metallic upper part. The parts of the burner encountered by the flame, and the interior parts, are constructed of some metal which is a good conductor of heat; the other external parts are constructed of material which is a bad conductor—such, for instance, as steatite—in order to prevent the escape of the heat.

The form of fan burner shown in fig. 4 is provided with two shoulders in the metallic upper part, with the object of increasing the quantity of heat transmitted to the gas, and of producing a longer passage of the gas itself in the interior of the burner, in order to give it the necessary time for a large "cubic expansion." The arrangement is more particularly applicable for acetylene gas.

Galleries and Burner Pipes for Incandescent Gas-Burners.—Wellstein, H., of Berlin. No. 12,617; May 21, 1897.

In many incandescent burners as at present employed, the gallery for the mantle is so massive as to obstruct the light radiating from the incandescent body. Further, the contact surface of the incandescent body with the gallery is so large that too much heat is withdrawn from the mouth. This drawback is removed according to the present invention by the gallery body being formed of narrow strips of metal, connected with one another at a suitable place by a smooth or corrugated bar. To obviate a further drawback in the incandescent burners—in that the mixture of air and gas as soon as it emerges at the top of the burner pipe burns directly along same, by which means the burner pipe becomes very hot, and thereby a considerable quantity of heat is withdrawn from the flame by the burner—it is proposed to provide the upper part of the burner pipe with a bell-like casing with perforations at its upper surface; or a plate provided at its outer edge with perforations is laid on, or suitably connected with, an upper open bell-like casing. The air and gas mixture flows through these perforations, and is there ignited. It thus cannot burn along the burner pipe, and thereby withdraw so much heat from the flame.

APPLICATIONS FOR LETTERS PATENT.

18,481.—Dinsmore, G. F., "Transmission of heat for making water gas," &c. Aug. 9.
18,528.—Lavaur, J. B., "Acetylene gas generators." Aug. 10.
18,565.—Clubbe, E. J., Southey, A. W., and the Electric Motive Power Company, Ltd., "Generation of oil gas." Aug. 10.
18,583.—Himmel, G., "Igniting gas-lamps." Aug. 10.
18,603.—Mitchell, T., "Generation and storage of acetylene and other gases." Aug. 11.
18,639.—Collin, F. J., "Coke-ovens." Aug. 11.
18,724.—Guillon, J., "Joints or unions for metallic, earthenware, or similar pipes." Aug. 12.
18,744.—Forbes, Sir C. S., "Acetylene lamps." Aug. 12.
18,745.—Forbes, Sir C. S, "Generators for acetylene gas." Aug. 12.
18,791.—Read, J. C. C., and Jellicoe, G. R., "Burners of lamps." Aug. 13.
18,841.—Clark, W. R., and Dyer, R. H., "Raising the pressure of gas in gas-pipes." Aug. 14.

Fatal Accident at the Millgate Gas-Works at Stockport.—The old Millgate gas-works of the Stockport Corporation were the scene of a disastrous accident last Tuesday, which resulted in the death of Joseph Woodall, aged 43. It appears that the deceased, in company with two other men, was engaged in pulling down a portion of the works, in order to make room for the electric lighting station, which is to be erected on the same site. The men were employed in dismantling the old purifier-house, beneath which is a cellar, which was formerly used for the storage of gas tar. The roof had been entirely removed with the exception of two huge beams, which ran across from wall to wall, bearing superstructures. The men were seated on planks resting on the principal beam and on the wall, unbolting and sawing away the upper woodwork, while below them was a clear drop of nearly 40 feet into the old tar-tanks. Without any warning, other than a loud grating sound, the principal beam snapped suddenly in two, and the whole structure, with its human load, fell with a terrific crash into the depths beneath. In the well were a number of upright pillars, upon which the men fell, and which were, it is said, to a great extent responsible for the shocking nature of the injuries. The men were rapidly extricated from this fearful position; and the aid of the police having been summoned, they were conveyed in ambulances to the Infirmary, where Woodall died about two hours after admission. The two other men—Maull and Higgins—sustained serious injuries. The inquest was held on Thursday, when the evidence of the Gas Engineer (Mr. S. Meunier) pointed to the cause of the accident being a defect in the grain of the beam. The Coroner adopted this view; and the jury returned a verdict to the effect that death was due to the accidental breaking of the beam. They added a rider that they considered "the best method of taking down the roof was not adopted, and that practical men ought to be employed by the Corporation in the performance of work of so dangerous a character." In regard to this addendum, it should be mentioned that Maull, who was the foreman of the job, had been employed at the works fifteen years, and had on several occasions been engaged on similar work.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The "Maintainable Profits" of Gas Companies.

SIR,—I wish to draw the attention of your readers to "a wrong that needs resistance," that those whom it concerns may fight it out of existence; for, unless they do, it is likely to cause them very serious loss. It affects all gas companies that may be purchased by local authorities. I refer to the plausible, but misleading, phrase recently adopted in arbitrations—"maintainable profits."

The maintainable profits of gas companies are their full dividends; and no company should listen to any overtures for purchase on any lower basis. It is not, however, in this sense that the phrase is used by adverse valuers. There is evidently a tendency on the part of some professional men acting for purchasing municipalities to follow the example of the rating surveyors who act for those bodies. Their object is not to make a fair valuation, but to make the best bargain they can for their clients; and, with this object in view, the term "maintainable profits" has been invented.

It can best be explained by supposing a case. A company has a small capital and a large reserve fund, and gas is sold at a low price—it having been reduced (say) two or three years ago because the high receipts for residuals produced an excess of profit beyond what was necessary to pay full dividends. Then a great change takes place in the value of residuals; and last year, and at the present time, the profits are not sufficient to pay the dividend. The company, however, rather than increase the price (which could legally be done), makes up the deficiency from the reserve fund. It does moreover something more. Advantage was taken of the good times to make extensive repairs and improvements from revenue; and now in the bad times no more is done in that direction than is necessary. The valuer comes upon the scene; he examines the accounts; and he finds that, while (say) £10,000 is wanted for the dividend, only £9000 has been earned. He starts with this £9000; and then finding the item of repair and maintenance less than *he thinks it ought to be* by (say) £1000, he deducts this sum from the £9000 profit, and says the maintainable profits are only £8000. So many years' purchase of £8000 amounts to so much—just 25 per cent. less than it ought to be on the really maintainable profits of £10,000.

Had the company been badly managed, with no reserve, with a heavy capital, *a large expenditure on repairs*, and with the price increased, it would have fared much better at the hands of the valuer. But a company that has for many years been well managed, has treated the consumers liberally, and acts as described above, is to be robbed—I can use no other word—by means of jugglery such as this. I do not deny that in exceptional cases either way something may not fairly be added or subtracted. The capital may be very high or very low; the works may be in a very bad condition, or not equal to what is required of them; or they may be in good order, and have a considerable amount of surplus plant. Such matters may have to be considered; but this is quite distinct from the new theory of "maintainable profits."

The profits of gas companies, by the simple and legal expedient of an adjustment of the price of gas, and often even without an increase of price, by recourse to their own money in the reserve fund, are maintainable at the level of full dividends. I hope, therefore, this new-fangled idea of maintainable profits will be knocked on the head.

Aug. 19, 1897. GEORGE LIVESEY.

Rating.

SIR,—The policy of reprisals announced at the half-yearly meeting of shareholders in the South Metropolitan Gas Company is a most unfortunate one. Doubtless, in the coming session of Parliament, many companies subjected to, or intending to be subjected to, the action of the sliding-scale will be under review before Committees of the House, when it is more than probable evidence will be given that the sliding-scale in a notable instance does not apply to the whole of a Company's district, but only to such part of it as may be comprised within the area where the rates levied are compatible with the amount thought to be equitable by the Company.

It will be no answer to allege that the surveyors are "marauders;" for the reply is obvious that the Court to whom the Company appealed upheld the opinion of those surveyors, and further that the surveyors were bound to give their opinion when called upon to do so by the solicitors advising the Assessment Committees.

The decision of the shareholders appears the more extraordinary inasmuch as the consumers who are called upon to pay the extra penny per 1000 cubic feet had no voice in the making of the rate, or influence upon the judgment pronounced by the Court.

Does not this defiance of that judgment by the shareholders—to whom it should not be a personal matter—show as much dictatorial spirit as the personal coercion of the Company's workpeople by trade unionist leaders?

Aug. 20, 1897. CLERKENWELL.

Gas and Water Supply in New South Wales.—Seventeen of the New South Wales municipalities have their own gas-works, constructed at a cost of £160,724. The water supply of towns is being largely attended to. In the colony, 24 municipalities own water-works, constructed at a cost of £546,088; and others are being established, at an outlay of £135,436, by six more municipalities.

Extensions at the Leeds Gas-Works.—Important extensions are being made at the Meadow Lane Gas-Works of the Leeds Corporation. A new building is in course of construction, which will be occupied by a number of inclined retorts. These are expected to be ready by the end of the year, and will increase the output of gas from 4½ to 7 million cubic feet per day. At a meeting, last Tuesday, of the Sub-Committee having charge of these works, the tender of Messrs. Oakes and Sons, of Hunslet, was accepted for the enlargement of the meter-house, at a cost of £660. A resolution was also passed recommending the Council to permit a contract to be entered into with Mr. G. Cross, of Leeds, for the construction of a tar-well for £700.

MISCELLANEOUS NEWS.

LIVERPOOL UNITED GASLIGHT COMPANY.

The Annual Meeting of this Company was held last Tuesday—Mr. EDWARD LAWRENCE presiding.

The accounts for the year ending June 30 showed that the total revenue during that period was £539,101; and the expenditure £422,139, leaving a surplus of £116,962, which had been transferred to the credit of profit and loss. After deducting the amount taken for the payment of the interim dividend and the interest on the debenture debt, there remained a balance of £53,462, out of which the Directors recommended a dividend for the past half year at the rate of 5 per cent. on the ordinary consolidated stock, and 3½ per cent. on the 7 per cent. stock.

The CHAIRMAN, in moving the adoption of the report, said that, in spite of all the opposition of the electric light, the past year had been a record one. The quantity of gas manufactured and sold was the largest on record as far as he knew in the history of the Company. This was eminently satisfactory, and would assure the shareholders that the property in which they were interested was as valuable as, or more valuable than, it had ever been. Referring to the capital account, he stated that no capital had been raised during the year; and the expenditure was very small—amounting in all to £22,000, of which about one-half was for a new main laid to Garston. In regard to the revenue account, the principal items to which he had to call attention were the cost of coal, and the receipts from gas and residual products. All the items of expenditure, except that mentioned, differed very little from what they were in previous years, though, of course, wages at the works came to more in consequence of the additional coal and cannel carbonized. During the year the expenditure for coal and cannel and other material for making gas amounted to £229,866, as against £228,980 in the previous year, or an increase of only £886. He regarded this as a very satisfactory result when they considered that they had actually used 25,000 tons of coal more than in the preceding year. Owing, however, to the coal having cost less—viz., 14s. a ton, or a shade under, as against 14s. 8d.—they had only paid £886 more than in the previous twelvemonth. Although the price of gas was reduced on July 1 last year from 2s. 10d. to 2s. 9d., they had received for gas sold, apart from public lighting, £9231 more than the previous year. This arose from increased consumption. The consumption of gas during the past twelve months had been something extraordinary; and it amounted in all to 3308 million cubic feet, against 3154 millions, or an increase of 154 millions. The increase was distributed as follows: To private tenants, 4·7 per cent.; to automatic meters, 19·8 per cent.; and to public lamps, ·37 per cent.—the total net increase being 4 489 per cent. The sale of residuals was their only weak point. Unfortunately, coke had produced £6105 less than in the preceding year, although they had disposed of 122,000 tons, against 104,000 tons. This, of course, was due to the market prices for coke, which the Company could not control. Tar, fortunately, showed an increase of £8367; while ammoniacal liquor had decreased by £3293. The price of sulphate of ammonia had been steadily declining during the year; and, as in the case of coke, they had to take the market price for it. He was disposed to think this product had reached the bottom. There now seemed to be a steadying in the price; and he hoped in the coming year they would show no further declension, but rather some little improvement. The profit for the year amounted to £116,962; and the dividend and debenture interest were equal to £116,690—showing a balance of £272. At the beginning of the year, the balance brought forward was £1407; and this had now been increased to £1679. The works had been kept in the highest state of efficiency. The officers had done their duty; and the results had been extremely satisfactory. The illuminating power of the gas had been rather less, and intentionally so—viz., about 20½ candles, against 21 candles in the preceding year; but as long as they kept above the 20 candles, that was all they were required to do, or that the Corporation expected of them. They were now in a far better position to discharge the duties cast upon them by Act of Parliament. No complaints whatever had reached them except from people who were burning more gas, and had to pay their bills. During the year they had had some of the usual threats of being swamped by formidable competitors, one of which was acetylene gas. It was a very brilliant gas; but whether in its present condition it was available for private consumption was a matter upon which he had grave doubts. At all events an attempt was made to start a Company, under very distinguished auspices, to produce the gas for the benefit of the public. But the public declined to have anything to say to it; and the consequence was the scheme dropped out of sight. More recently they had received an assurance that a discovery had been made by which electric light was to be produced at a very cheap cost. They had always recognized electricity as a formidable opponent; but though they had had a great many warnings as to what it was going to do in the direction of extinguishing the Company, they found that the demand for gas continued to increase. Whether cheaper electricity would be produced, he could not say. They must patiently wait; and at the worst they would have to meet competition in the best way they could. However, he did not think they had any reason to fear that the position of gas was a less safe one than it had been in the past. There was no indication of it at present; and their experience was similar to that of all other gas companies in England. In all cases, no matter what the electric light had done, the demand for gas improved everywhere. Their position with the Corporation was very satisfactory; and he referred the public to Mr. Bellamy's report to show what he, at all events, thought of the work of the Gas Company.* Mr. Bellamy said there was no Company in England whose gas was so severely tested as was the gas of Liverpool. He tested it continuously in all parts of the city without the knowledge of the Company; and his experiments showed that the candle power had been maintained at about 20·89. This was a sufficient answer to anybody who found fault with them. Occasionally they heard a growl (as in the Council Chamber recently) and threats to make the Gas Company "sit up;" but they could afford to smile at such remarks, and treat them as mere matters of amusement. The Company knew their obligations to the public. If the Corporation thought they

* See JOURNAL, Vol. LXIX., p. 1074.

did not fulfil those obligations, they had a means of bringing them to book; and they ought to do so, instead of constantly peddling away, and saying they were not doing their duty. The Company were ready to face an inquiry on any point. It would be far more straightforward on the part of members of the Corporation to say at once that they were not doing their duty in some specified matter, and try to bring them to account.

Mr. J. B. Smith seconded the motion, which was carried.

The dividend recommended was declared; and the retiring Directors and Auditor were unanimously re-elected.

A hearty vote of thanks to the Chairman and Directors concluded the proceedings.

CROYDON COMMERCIAL GAS COMPANY.

Half-Yearly Report and Accounts.

In the report which the Directors of the above-named Company will present to the shareholders at the ordinary general meeting to-morrow, they state that in the six months ending June 30 there was an increase of 9·32 per cent. in the quantity of gas sold, as compared with the corresponding period of 1896; but, on the other hand, reduced amounts were received for residual products. Large numbers of additional gas cooking and heating stoves were fixed; the extension of the automatic prepayment system having added materially to the number of consumers. The position of the Company is shown by the result of the last issue of 7 per cent. stock, £5000 of which realized at a public auction £13,858 5s., or an average of £277 3s. 3d. per cent. The accounts accompanying the report show that the revenue from the sale of gas was £42,774; the rental of meters, stoves, and fittings came to £2253; the sale of residuals produced £11,858; and the total receipts amounted to £56,956. The manufacture of gas cost £31,062 (£21,199 being for coal and oil, and £3872 for the repair and maintenance of works); distribution entailed an expenditure of £4190; management cost £2039; and the total expenditure was £42,008—leaving £14,948 to go to the net revenue account. After providing for all fixed charges, the amount available for distribution is £14,682; and the Directors recommend the declaration of dividends at the rates of 14, 11, and 9 per cent. per annum on the several classes of capital. These will amount to £14,536, and leave £146 to be carried forward. Under the supervision of the Company's Engineer and Manager (Mr. J. W. Helps, Assoc.M.Inst.C.E.), the carbonizing plant dealt with 28,783 tons of coal, 1049 tons of cannel, and 7282 gallons of oil in the past six months. The make of gas was 329,257,000 cubic feet, of which 312,812,500 cubic feet were accounted for. The estimated quantities of residuals produced were: Coke, 357,984 cwt.; breeze, 90,706 cwt.; tar, 307,479 gallons; ammoniacal liquor, 762,525 gallons. There were 86,000 gallons of liquor in store at the close of last year; and 781,511 gallons were used in the past six months—the make of sulphate of ammonia being 287 tons, of which 244 tons were sold.

PROVINCIAL GAS AND WATER COMPANIES.

Gas Companies.

At the meeting of the Bristol Gas Company on Friday, the Chairman (Mr. Alderman J. W. S. Dix), in moving the adoption of the report, as noticed in the "Journal" last week, remarked that, though the reduction of 2d. per 1000 cubic feet in the price of gas made a difference of £6000 in favour of the public, such was the elasticity of the Company's business that there was only an apparent decrease of £333. They had completed the gasholder at Warmley; and its working would assist them in the distrlbution of gas in that large and increasing district. They were about to inaugurate one at Bedminster to meet the increasing demands of the neighbourhood. He was glad to note that there was a satisfactory increase in the number of stoves; there being 417 more in use than during the previous half year. There was also a fair increase in the supply through automatic prepayment meters, but scarcely so great as might have been anticipated, having regard to the comfort, cleanliness, and economy of gas. Since their last meeting, the boundaries of the city had been extended; and the consequent increase of population put Bristol in the leading rank of cities. The Company had protected their powers under their new Act; and though these remained intact, which enabled them to charge extra for the supply of gas outside the old boundaries, the Directors did not propose to avail themselves of them, and with the new year the people in the added areas would be charged at the same rate as those within the previous limits of the city. The report was adopted, and the dividend recommended declared.

At the annual meeting of the Faversham Gas Company on Thursday, Mr. J. A. Anderson (Deputy-Chairman) presided, and moved the adoption of the Directors' report, which showed an increase of £310 in the receipts for gas, but a drop of £27 in the return from residuals, as compared with the preceding year. The net profit amounted to £2659, out of which a dividend at the rate of 9 per cent. was recommended. The report and recommendation were adopted.

The Hartlepool Gas and Water Company have had a satisfactory increase in both branches of their business. The net revenue amounts to £30,386 for the year, as against £28,791 in the previous year. The Directors recommend the payment of dividends for the last six months at the rate of 10, 7½, and 7 per cent. per annum on the various classes of capital—leaving a balance of £2048 to be carried forward. New gas purifying plant has been completed, and is working satisfactorily. In consequence of the large increase in the consumption of gas and prospective growth, the Directors have decided to proceed with the erection of additional manufacturing plant.

The revenue account of the Malton Gas Company for the past half year shows a profit of £1327, which, with the amount brought forward, makes a total of £2165 at the credit of the profit and loss account. After deducting interest on loans, there is a disposable balance of £2092, from which it has been agreed to pay a dividend of 5½ per cent. To meet the expenditure on capital account, a further call of £1 per share has been made.

At the annual general meeting of the Morecambe Gas Company on the 21st inst., the Directors will report that, notwithstanding the reduction which took place in the price of gas on the 1st of October last, there has been an increase in the amount received for gas supplied. The additional consumption will necessitate an enlargement of the retort-house and the replacement of a number of the existing retorts during the current year. The total revenue in the twelve months ending June 30 was £9375; the expenditure, £5326—leaving £4049 to go to the profit and loss account. The balance available for distribution is £3118; and the Directors recommend the payment of a dividend of 6 per cent. for the past six months; making 11 per cent. for the year. Under the supervision of Mr. W. Duff, the Secretary and Manager, 4915 tons of coal and cannel were carbonized and used; the make of gas being 45,852,200 cubic feet, of which 43,906,200 cubic feet were accounted for. The estimated quantities of residual products were; Coke, 3096 tons; tar, 53,750 gallons; and ammoniacal liquor, 40,041 gallons—the make of sulphate being 37 tons 5 cwt.

At the half-yearly general meeting of the Reading Gas Company last Tuesday, the Directors in their report referred with pleasure to the continued progress in the Company's business, and to the fact that during the six months ending June 30 there was a large increase in the number of cooking-stoves let on hire. It was pointed out that, owing to the new contracts for coal and tar having been entered into at a small advance in the former, and at a reduction in the latter case, the cost of gas manufacture would tend to increase in the current year. The accounts showed that the sale of gas for public and private lighting produced £22,161; residuals brought £5903; and the total revenue was £28,149. The manufacture of gas cost £17,385 (£12,274 being for coal and £4292 for wages and maintenance); its distribution, £1930; and management, £1300. The total expenditure was £22,925; the balance carried to the profit and loss account being therefore £5224. This account showed a sum of £17,382 available for distribution; and the Directors recommended the payment of the maximum dividend upon all classes of stocks and shares. They testified to the excellent condition of the works, and to the able way in which they had been conducted by the Engineer (Mr. E. Baker, Assoc.M.Inst.C.E.). Under his supervision, 14,929 tons 3 cwt. of mixed gas coal were carbonized in the six months covered by the accounts. Of the total bulk of gas sold, 144,066,500 cubic feet were used within, and 4,113,800 cubic feet beyond the borough; and 10,002,675 cubic feet was the estimated consumption for public lighting. The residuals produced were: Coke, 14,929 chaldrons; breeze, 133 loads; and tar, 160,205 gallons. The quantity of ammoniacal liquor is not given in the accounts; but 150 tons of sulphate were made in the half year.

A large increase in the demand for gas was a marked feature of the past half-year's working, as reported by the Directors at the meeting of the Scarborough Gas Company on Saturday. The receipts for gas sold to private consumers amounted to £12,640; public lighting brought in £1603; the rental of meters and stoves, £911; and the sale of residuals, £2538—the total revenue being £17,727. The expenditure on the manufacture of gas was £9787; on its distribution, £1193; on management, £771—the total outlay being £13,065. There was consequently a balance of £4662 to go to the net revenue account, which showed a sum of £5938 available for distribution; and the Directors recommended the payment of the maximum dividends. This would absorb £5772, and leave £166 to be carried forward. The storage plant has been extended by the erection of an additional holder, which, however, is not yet out of the contractor's hands. Under the supervision of the Company's Engineer and Secretary (Mr. J. Holliday), 9980 tons of coal and 102 tons of cannel were carbonized in the past half year. Of the total bulk of gas produced, 92,823,800 cubic feet were sold for private consumption and 9,152,911 cubic feet for public lighting. The estimated production of coke was 6049 tons; tar, 682 tons; ammoniacal liquor, 1014 tons.

Mr. E. G. Heard presided at the annual meeting of the Truro Gas Company, Limited, which was held yesterday week, and congratulated the shareholders on the prosperous condition of the undertaking. The balance of profit and loss account was £1755; and the Directors recommended the payment of a dividend of 6 per cent., which would absorb £960, the addition of £200 to the reserve fund, and the carrying forward of £595. The position of the Company was, on the whole, more favourable than ever. The works were in a thoroughly efficient condition, owing mainly to the zealous Manager (Mr. S. J. Ingram), under whose supervision great improvements had been made the last few years. The revenue from the sale of gas, &c., had increased by £800; the production having increased by 2 million cubic feet, or about 6 per cent., during the year. While the revenue had increased, the expenses had been less. They had sold upwards of 700 tons more coke than they did two years ago; and though they had carbonized 250 tons more coal, they had used 430 tons less coke. They were, in fact, able to save 30 per cent. more coke than formerly—an economy due to the introduction of more modern methods in working the concern, including the use of a Meldrum furnace in connection with one of the boilers. Prepayment meters had brought a new class of customers, and had proved of great advantage. In conclusion, the Chairman referred to the reduction in the price of gas, and said that, though the Company were under contract with the Corporation for a considerable time to come, they felt it would be right in point of equity to make a proportionate reduction in the charge for the 230 public lamps. The report was unanimously adopted; and the Directors and officers were thanked for their services.

The half-yearly general meeting of the Wakefield Gas Company was held on Monday last week—Mr. W. A. Statter, J.P., in the chair. The Secretary (Mr. W. H. Parker) having read the notice convening the meeting, the report and accounts were taken as read. The latter showed a balance of £6911 available for distribution; and the declaration of dividends at the rates of 11½, 9, and 8½ per cent. per annum on the various classes of capital was recommended. The Chairman, in moving the adoption of the report, said the undertaking had now completed fifty years of its existence; and probably a few items relating to the early history of the Company would be interesting. According to a circular letter issued at the time, a meeting was held in Wakefield Court House on Oct. 6, 1821, to consider the desirability of forming a Gas Company; and the result was the formation of a Committee for "adopting such measures as may be necessary for carrying the plan into effect." It was resolved that "no person should subscribe for more than 20 shares." The capital was not to exceed £10,000 in shares of £25 each, with power to borrow £2500 more if necessary. An Act was obtained on April 3, 1822, and the erection of the works was at once proceeded with; and on

Friday, Jan. 31, 1823, the new light was used for the first time. In some cases, the gas was supplied at a stated price per light, and customers were expected to put out the light at a certain time; in others, the charge was 12s. per 1000 cubic feet. A minute-book of those days contained the following, under date March 25, 1826: "That a Committee be appointed for the purpose of adopting measures to destroy the tar, ammonia, and other matters." According to a statement of accounts for the six months ending Oct. 30, 1829, coals cost £138 6s. 9d., and the total income was £1042 12s. 10d. The "offensive matters," tar and ammonia, realized £8 17s. 11d.; while in the past half year the returns from them amounted to £1373 3s. 11d. On July 9, 1847, the Company was re-incorporated with a capital of £25,000, in 1000 shares of £25 each, and £7500 in 1500 shares of £5 each. The total income for the half year ending Dec. 31, 1847, was £2351 17s. 7d., as compared with £17,446 19s. 3d. for the six months ending June 30, 1897. The quantity of gas sold in 1847 was 11,593,000 cubic feet, as compared with 103,468,300 cubic feet in the half year ending June 30, 1897. It was worthy of notice that the whole of the gas sold for the year 1847 was only equal to the quantity consumed through the automatic meters in 1897. This realized £1028 in the past half year; while the weight of coppers taken from the meters equalled 3 tons 5 cwt. The make of gas in the six months covered by the report was 113,648,000 cubic feet; and the quantity unaccounted for was at the rate of 6·41 per cent. The rates amounted to £1255 13s. 4d. On this point, Mr. Statter said theirs was the heaviest-rated gas undertaking in the country. The Directors had taken the necessary steps to get the assessment reduced, and hoped to succeed; but as the matter was *sub judice*, they could not give the shareholders further information. Along with his colleagues, he had considered the matter of the price of the gas; and they had decided to reduce the charge 2d. per 1000 cubic feet on all gas consumed after the taking of the indices for the ensuing Michaelmas quarter, and also to put in service-pipes for new consumers, if within 25 yards of the nearest main, free of charge from and after Oct. 1 next. The report was unanimously adopted; and the Chairman was thanked for his interesting statement. The dividends recommended were then declared; and the proceedings closed with votes of thanks to the Chairman and Directors, the officers, and the staff—the ability and devotion of the Secretary (Mr. Parker) and the Engineer (Mr. H. Townsend) being specially mentioned.

The accounts of the Waltham Abbey and Cheshunt Gas Company for the six months ending June 30, which will be presented at the half-yearly meeting on the 27th inst., show receipts to the amount of £3793, and an expenditure of £2524; leaving a balance of £1269. The undivided profits stand at £1838; and from them the Directors recommend the declaration of dividends at the rate of 7 per cent. per annum on the "A" shares, and of 5 per cent. per annum on the "B" and "C" shares. This will leave £857 to be carried forward. Compared with the first half of 1896, the rate of increase in the sale of gas has been well maintained; and a slight additional revenue from residuals has been gained, notwithstanding the continuance of unfavourable prices. The expenditure on capital account in the half year was £3003; and as this account has been overdrawn to the extent of £764, new "C" shares to the amount of £6250 are in course of issue.

The half-yearly meeting of the Wellingborough Gaslight Company, Limited, was held yesterday, when the Directors reported an increase of nearly 16 per cent. in the sale of gas in the six months ending June 30, as compared with the corresponding period of 1896; and it is satisfactory to find that this is a better result than has been obtained since 1874. The receipts for gas amounted to £4961, against £4300 in 1896; and the total revenue was £6048, against £5316. The expenditure being £4089, there was a balance of £1959. The amount available for distribution was £2401; and the Directors recommended dividends of 5½ and 4 per cent. for the half year, free of income-tax. Extensive improvements are being made in the works, under the supervision of the Engineer and Manager (Mr. J. T. Lewis); and it is intended to have them ready by the autumn of next year. The capital expenditure up to June 30 was £41,802, or at the rate of £6 1s. 8d. per ton of coal carbonized. Taking the working for the twelve months ending at that date, the make of gas per ton of coal was 10,952 cubic feet, of which 10,485 cubic feet were sold; the quantity unaccounted for being 3·54 per cent. of the make. The coke sold was 9 cwt. 3 qrs. 9 lbs. per ton of coal carbonized.

Owing to the lower prices obtainable for residual products, the Westhoughton Gas Company have declared a reduced dividend for the past half year—viz., at the rate of 5 per cent. per annum, which is ½ per cent. less than in the two preceding half years. The total receipts amounted to £1730; and the expenditure to £1142.

At the meeting of the Weymouth Gas Company next Thursday, the accounts presented will show receipts (29,842,800 cubic feet of gas sold for public and private lighting) to the amount of £5685, and a total revenue of £6807, in the half year ending June 30. The expenditure in this period having been £4536, there was £2271 to go to the profit and loss account. The balance on this account being £3569, the Directors recommend the declaration of maximum dividends on the stock and share capital, for which the above will more than suffice after the payment of the debenture interest. They report an increase of 7¾ per cent. in the sales of gas in the past six months, compared with the corresponding period of 1896. Reference is made to the successful passing through Parliament of the Bill promoted by the Company to extend their limits and raise more capital.

Water Companies.

The half-yearly meeting of the Chatham, &c., Water Company was held on the 12th inst.—Mr. J. Baird presiding. The Directors in their report which was read by the Secretary (Mr. G. G. Catt) stated that the gross water rental in the six months ending June 30 were £9686, out of which provision was made for discount to consumers, absorbing £1017; and the total revenue was £8527. The expenditure being £4971, there was a sum of £3556 to go to the net revenue account. A dividend at the rate of 10 per cent. per annum, free of income-tax, was recommended. In moving the adoption of the report, the Chairman remarked that everything was going on very well, especially in regard to the increased number of houses and the consequently greater demand for water. The report was adopted.

The Stockport Water Company have been enabled to declare an additional ¼ per cent. dividend for the past half year, and yet increase the balance carried forward from £616 to £1108. After paying the interest on debentures amounting to £1122, the profit for the six months was £9383, which, with the £616 brought from the last accounts, left a balance in hand of £9999, out of which dividends at the following rates are to be paid: 2½ per cent. on the 5 per cent. preference stock, 2¼ per cent. on the 4½ per cent. stock, and 6¾ per cent. on the ordinary stock. During the half year, £4552 was expended on extending and improving the mains and the Wilmslow pumping-station.

Sir Allen Sarle presided at the half-yearly meeting of the Sutton District Water Company on the 11th inst., when the report presented showed capital outlay of £836 during the half year chiefly in completing a new main from Cheam to Ewell. The expenditure on capital account now exceeds the receipts by £2689; and the Directors have decided to make a further issue of 4½ per cent. preference stock to the extent of £2000. The gross rental for the six months ending June amounted to £5938; and the balance of profit (including £490 brought forward) was £3492. The Directors recommended a dividend at the rate of 9½ per cent. per annum, which would absorb £2700. This was agreed to.

The working of the Whitby Water Company during the past half year resulted in a disposable balance of £1585. From this the dividend on the preference stock is to be provided for; and a dividend at the rate of 8 per cent. per annum is to be paid on the ordinary shares. The Directors have been empowered to raise, as additional capital, the sum of £10,000 by the creation of new shares, the maximum dividend on which is to be at the rate of 7 per cent. per annum.

At a meeting of the Woking Water and Gas Company on the 31st inst., the Directors will report that the revenue during the half year ending June 30 was £3596, and the expenditure £1420—showing a profit of £2176. The balance available for distribution is £2002; and the Directors recommend the payment of an interim dividend at the rate of 4 per cent. per annum, free of income-tax. This will absorb £1556, and leave £446 to be carried forward.

According to the annual report of the Directors of the Wrexham Water Company, considerable progress has been made with works for providing additional supplies of water to meet the increasing requirements. New mains have also been laid to improve the service in various parts of the district. The expenditure on capital account, amounting to £3899, is chiefly due to these new works and extensions. The receipts upon revenue account show an increase of £363, as compared with the preceding year. Connections have been made to 151 houses; making a total of 5064 houses now supplied. After payment of the usual charges, the full dividends upon the preference shares and stock, the interim dividends of 5½ per cent. per annum upon the consolidated stock, and £3 17s. per cent. per annum upon the ordinary shares, and interest on mortgages, a balance of £3312 remains on net revenue account. From this the preference dividends, and dividends at the rate of 5¾ per cent. per annum on the consolidated stock, and 4 per cent. per annum on the ordinary shares, are to be paid. During the past ten years, the receipts of the Company have increased by £2000.

THE SOUTH METROPOLITAN GAS COMPANY'S PROFIT-SHARING SCHEME.

In an article headed "A Great Industrial Departure: A Profit-Sharing Experiment and its Results," the "Pall Mall Gazette" last Wednesday dealt with the origin and effect of the profit-sharing scheme of the South Metropolitan Gas Company. The writer describes the scheme as undoubtedly one of the most interesting experiments in modern commercial ethics;" and, in order to efficiently explain the results, he gives a succinct account of the events of nine years ago which led to the substitution of non-union for union labour in the Company's works. He then proceeds to explain the scheme as follows:—

The profit-sharing system introduced at the South Metropolitan Gas-Works is founded on the sliding-scale, and takes its basis on a standard price for gas, which is fixed at 2s. 8d. per 1000 cubic feet. The bonus is fixed as a percentage on the man's earnings; the ratio being 1¼ per cent. for every 1d. at which gas is sold below the standard 2s. 8d. Thus, when gas is charged at 2s. 7d., the employee gets a bonus of 1¼ per cent.; if it goes to 2s. 6d., he gets 3 per cent.; and so on. The present price being 2s. 3d., the workers receive 7½ per cent. over and above their agreed earnings. This bonus is saddled with one condition—that one-half of the amount received must be invested in the Company's stock.

In order to protect themselves from a recurrence of the experiences of the winter of 1888-90, the South Metropolitan Company take a variety of precautions. Every man in their employ, excepting the casual labourers, has a written agreement with the Company for a specific time—either three, six, nine, or twelve months; and under the Conspiracy Act the men are liable to arrest and imprisonment if they break their agreements. And it is also noteworthy that the agreements are not all issued at the same time, so that it becomes impossible for a large proportion of the hands to give notice to leave their work at the same date.

The working of the bonus scheme was watched with considerable anxiety, both by the officers and the men. Until the first division of bonus, the whole matter was one of theory; but when the payments were actually made, the hands realized that they were in for a good thing, and an immediate access of willingness and improvement in the working became apparent. It is no unusual thing for a workman to point out improved methods of work, or to make suggestions for reducing expenses, with a view to cheapening production, and thereby increasing the bonus, which is always paid at Midsummer.

The method followed in handling the sums to be invested is by the interposition of Trustees, named by the workmen and the Company jointly. The average earnings of the workmen employed by the Company are, as nearly as possible, £100 a year; and an average worker receives, therefore, a bonus of £7 10s., £3 15s. of which he must leave to be invested with the Trustees. The balance is handed to him in cash if he desires it, or he may leave it on deposit at 4 per cent., or elect to have it also invested. As soon as a man has a sum of £5 to his credit with the Trustees, stock is bought for him to that amount—this being the

smallest fraction into which the stock can be split. It is noteworthy that 30 per cent. of the men elect to invest their entire bonus in the Company; the usual custom being to have the stock inscribed in the joint names of the worker and his wife or mother. A large number of the men have more than £100 thus invested, though the scheme has only been in existence for seven years. This shows that they have brought money in from outside. It often happens that a man will withdraw his money from the savings bank or building society to re-invest it in South Metropolitan stock.

Such are the principles followed in this profit-sharing experiment, which works among the men with the best possible results. It remains to be seen how its introduction has affected the Company. During the seven years in which the experiment has been in progress, upwards of £82,000 has been paid or credited in bonuses, of which in round figures £46,000 odd has been invested in the Company's stock, and £36,000 withdrawn. But, on the other hand, a number of thrifty workers have actually saved money out of their ordinary wages; and no less than £26,000 has been in this way invested. It will thus be seen that the men have accepted the Company's offer *con amore*, and that with but few exceptions every worker—and they number nearly 3500 in all—is a shareholder, and has interests identical with those of the Company.

But the payments involved are heavy; and it naturally occurs to the observer to ask whether the Company get value for the cost involved. On this and kindred points we have had the advantage of an interview with Mr. George Livesey, the Chairman, and with Mr. Frank Livesey, the Engineer, of the Company; and both agree that the Company not only get value, but profit largely by the maintenance of the profit-sharing principle. Thus it is stated that one of the greatest responsibilities of management used to be the maintenance of a friendly feeling with the men. The necessity for this is at an end. The men are the Company, and they work for it amicably and willingly; for they have learned that while working for it, they are also working for themselves. The men also realize that the Directors are their friends, while the Trade Union was "both cruel in its treatment and dishonest in its methods." (The words are Mr. George Livesey's, and are printed with his permission.) The policy of the Union is to insist on each man doing as little work as possible. The policy of the men to-day is to do as much as they can; and so marked is the willingness of the stokers, that it has more than once been necessary to check them doing more work than is needed.

And most remarkable of all, this Company, despite its annual voluntary payment of nearly £20,000 in profit-sharing, is in a more satisfactory condition than any of its compeers. Indeed, we are not acquainted with any undertaking which presents so many striking anomalies as does the South Metropolitan Gas Company. Here are a few startling facts and figures which, for purposes of comparison, are contrasted with similar statistics respecting The Gaslight and Coke Company, who light a district twice as big, and by being able to do things on a bigger scale should succeed in working more economically. The figures are for 1896:—

	South Metropolitan Gas Company.		The Gaslight and Coke Company.
Cost of coal per ton	10s. 4½d.	..	11s. 5¾d.
Dividend	13 p.c.	..	12¾ p.c.
Stokers' wages per ton	2s. 5d.	..	3s. 4½d.
Distributing cost per 1000 cubic feet	2 0	..	2 4
Produce of residuals per ton	4 3	..	5 6¾
Price of gas per 1000 cubic feet	2 3	..	2 10

From the above table we see that the South Metropolitan Company pays less for its coal and less wages per ton, but considerably more per man, owing to the profit-sharing and the use of improved machinery without restrictions. It handles its gas more economically, charges 20 per cent. less for it, and yet pays a higher dividend than does its big rival.

Such are the bare features in the first introduction of profit-sharing in this country. The only wonder is that it still remains the only one. How long it will remain so has yet to be seen.

Sales of Shares.—At Pudsey, a few days ago, Mr. H. Gott sold by auction £3000 of new consolidated 7 per cent. stock of the Pudsey Gas Company; being a portion of the additional capital authorized to be raised early last year. Though nominally 7 per cent. stock, it is entitled to 8¾ per cent. at the present price of gas. It was put up in £100 lots, which fetched an average of £222 1s. each; yielding the purchaser £3 18s. 9d. per cent. A few shares in the Hythe Gas Company recently changed hands at £8 and £8 2s. 6d. each. At Haslingden, last Wednesday, five "A" shares in the Haslingden Union Gas Company were sold by public auction for £24 10s. each.

Serious Gas Explosion at a Roman Catholic College.—St. Bede's Roman Catholic College, Manchester, was the scene of an alarming gas explosion last Thursday, which resulted in injury to three persons, and considerable damage to the building. It appears that for some time past a smell of gas had been noticed in the students' dormitories over the entrance hall; and on Thursday this became so accentuated that a plumber named Scott was sent for to make an examination. In a small room to the right of the main entrance, the gas and water meters are kept; the former being of a large size—supplying 400 lights. It was while Scott was making an examination in this room that the explosion occurred. Both he and the hall porter were burnt by the flame; and a priest who was some thirty yards away was violently thrown to the ground and injured. The damage is estimated at £500.

Visit of the Truro Gas Company's Employees to the Plymouth Gas-Works.—On Friday, the 13th inst., the employees of the Truro Gas Company had their annual outing. By arrangement, they visited Plymouth; and, among other places, they went to the gas-works, where they were interested in the West charging and drawing machinery and the installation of carburetted water-gas plant now in course of erection. Mr. A. Wharton, the Manager, conducted them round the works and entertained them to light refreshments; and, on the motion of Mr. S. J. Ingram, the Manager of the Truro Gas-Works, he was heartily thanked for his hospitality. Subsequently the party dined together—Mr. Ingram presiding. The toast of "Success to the Truro Gas Company" was heartily drunk; and the Chairman, who acknowledged it, gave "The Visitors," for whom Mr. Wharton and Messrs. H. E. Riley and W. J. Lean, the Managers of the St. Austell Gas-Works and the Truro Water-Works, responded.

GLASGOW CORPORATION GAS SUPPLY.

The Past Year's Working.

At the Meeting of the Glasgow Corporation on Thursday, the accounts of the Gas Department, a summary of which was given in our "Notes from Scotland" last week, were presented.

Bailie Fife, in submitting the accounts for approval, said it must be gratifying to find that, considering a reduction was made last year of 2d. per 1000 cubic feet in the price of gas, they had still an income of £607,622; and that, after writing off depreciation, annuities, and interest on borrowed money, and providing for the sinking fund, they were enabled to show a small surplus, with a balance of £359 18s. 6d. to go forward to the year now beginning, and this in spite of the fact that from residual products, instead of realizing as much as they did last year—viz., 2s. 6d. per ton of coal carbonized—they had received only 2s. 1d. This alone meant a difference of about £12,000. The Gas Committee thought fit to ask the Corporation to sanction the continuance of the price of gas at 2s. 2d. per 1000 cubic feet for this year. In conclusion, he said it seemed to him that now the Electricity Committee were acting for themselves, apart from the Gas Committee, they should have power to borrow their own money. As for the latter Committee, they had reached within £11,000 of their borrowing power, which would not be sufficient to meet the cost of extensions at Dawsholm, apart from the erection of the new works which the increase in the use of gas had rendered necessary. He moved the approval of the accounts.

Mr. R. M. Mitchell seconded the motion. He said he wish ed to make a few remarks in regard to the manufacturing department. It was a pleasure to the Gas Committee to be able from year to year to bring before the Town Council satisfactory statements, indicating a condition of efficiency and prosperity which had now continued for many years. Additional plant had been contracted for, to be erected at Tradeston and Dawsholm; and it would be interesting to the Corporation to know that when this was completed every available piece of ground in the gas-works would be covered. This brought them face to face with necessary extensions; and before long new works would be required to meet the ever-increasing demand for gas, which, notwithstanding the introduction of electricity, progressed steadily from year to year. A small Committee, along with the Engineer (Mr. W. Foulis), had been giving this subject their attention for some time, and they expected to be able to bring the matter at no distant date before the Corporation, with a view to proceeding to Parliament for the necessary powers for the erection of such works as might be necessary. In this connection, the following figures were of interest: While in the year 1892 458,000 tons of coal were carbonized, in 1896-7 there were 555,000 tons carbonized; being an increase of nearly 25 per cent. The expense of manufacture had decreased from £429,000 to £414,000, due partly to reduction in the price of coal, but principally to the improvement effected in the gas-works during these years; and this accounted for their being able to supply gas at so cheap a rate. As regarded the coming year, they were hopeful that the cost of production would not be increased. This was owing principally to continued favourable purchases of coal, which was hardly any dearer than that for last year. The statement reported that day as having been made at a miners' meeting, that the Corporation had paid 1s. 3d. per ton more for about 435,000 tons of coal for the year as compared with last year, was entirely erroneous, and was a rate which could not be afforded at the present selling price of gas. He need hardly say that the favourable results were chiefly owing to the diligence, efficiency, and ability of their Engineer and his colleagues, as well as the other officials of the Corporation.

The motion was agreed to unanimously.

BINGLEY DISTRICT COUNCIL GAS UNDERTAKING.

Good Working Results.

Mr. J. Gatecliff, the Chairman of the Gas Committee of the Bingley District Council, had the satisfaction, yesterday week, of being in a position to make an excellent report to his colleagues on the working of the gas undertaking during last year. He said the quantity of gas manufactured was 82,912,200 cubic feet, with a gross leakage of 5,450,500 feet, or equal to 222,469 feet per mile of main. In the manufacture of the gas 8242 tons of coal were carbonized, giving an average yield of 10,059 cubic feet of gas per ton. The total sales had been 77,155,900 cubic feet, which realized £10,640. For 3666 tons of coke they obtained £1145; and tar, liquor, and other receipts amounted to £1032. The expenditure totalled to £6710; and on maintenance they spent £719. In addition they had paid as interest on loans £682; and to the sinking fund account £1175. There was at the end of the year a balance in hand of £1447. The gross profits from all sources amounted to £3304. The capital stood at £20,266; while the estimated value of the plant was £40,890. The mains now measured 24½ miles. The reserve fund was £3321; £277 having been withdrawn during the year. The amount of loans repaid was £29,790. The introduction of gas-cookers had been a brilliant success, and had helped to materially lower the price of gas. He would, at their next meeting, ask the Committee to again reduce the price by 2d. per 1000 cubic feet from July 1, as he felt certain there would then be a balance of £800 to £1000. At present they held a position second to none in the United Kingdom among gas undertakings. When their Gas Engineer (Mr. G. D. Malam) took charge of the works 22 years ago, the price of gas was 4s. 6d.; and now it was 2s. 6d. At that time, the capital was £40,000; to-day, it was £20,000. He thanked the officers for their assistance; and especially Mr. Malam, who had given them 22 years' faithful service, which were worthy of thanks not only from the Council, but from the whole town. The Chairman (Mr. J. Stephenson) said he certainly should go in for a reduction in the price of gas; but he would support a motion that the charge be uniform for all purposes. A vote of thanks was accorded Mr. Gatecliff and the officers for the report.

New Reservoir for Ashford.—The Local Government Board have sanctioned the borrowing of £3350 by the Ashford Urban District Council for the construction of a new reservoir.

LEAMINGTON GAS-WORKS PURCHASE QUESTION.

Report by Mr. Thomas Newbigging.

A paragraph in last week's issue intimated the fact that Mr. Thomas Newbigging, M.Inst.C.E., of Manchester, had reported to the Leamington Town Council on the proposed purchase by them of the Gas Company's works. The text of the report has been published in a local paper; and therefrom we extract the following information.

Dealing first with the capital of the Company, Mr. Newbigging shows that the total raised by shares and loans is £71,790. The share capital amounts to £60,000, on half of which the authorized dividend is 10 per cent., and on the other half 7 per cent. The loan capital amounts to £11,790; the average interest payable being 4·35 per cent. The Company have power under their Special Act of 1865 to issue £40,000 further 7 per cent. capital.

The amount of the reserve fund to the Company's credit is £8729, and is invested in Consols. As the nominal capital, both share and loan, amounts to only £71,790, the reserve fund, when full, should stand at £7179 only. Being £8729, it is £1550 in excess of what is allowed by statute. Under section 64 of the Leamington Corporation Act, 1896, the Company, in the event of a transfer taking place, have power given them to claim the authorized reserve fund, or any part thereof. The section, however, further provides that, in valuing the undertaking, consideration must be taken of the reserve fund, or any part thereof withdrawn from the purchase.

The gas-works site, which is freehold, comprises an area of about 4½ statute acres. The works are not, Mr. Newbigging remarks, as well set out on the site as they might be; but that is a fault which appertains to most works of the kind that have grown up piecemeal—extensions having been made as required, and "with the minimum of forethought." The area of the site, however, is sufficiently ample to allow of a much larger daily production of gas than the present maximum. Generally, the buildings are in good condition, brick built, fairly well designed, and most of them comparatively new. The exception to this is the retort-house, which is the least satisfactory of the whole, constructed with thin walls, not sufficiently high, and otherwise meagre in character. There is canal communication with the works; the bulk of the residual products being sent away by boat. The coal used comes by railway, and has to be carted—a portion of it 1100 yards, and the remainder 550 yards, to the works.

Regarding the price of gas, the report states that the authorized maximum within the Parish of Leamington Priors is 4s. per 1000 cubic feet to private consumers, and 3s. 6d. for the public lamps. Half a mile from the borough boundary the maximum is 5s. 6d. The prices charged therein by the Company at the present time are 2s. 5d. to private consumers, and 2s. 4d. for public lamps within the borough, and 2s. 11d. outside.

Mr. Newbigging has made a careful structural valuation of the property, including the freehold land. The total amount of this he puts at £78,011. So that the nominal value of the share and loan capital (£71,790) is more than represented in the apparatus, machinery, fixed and loose plant, and buildings, including also the cottage houses belonging to the Company. The book value (structural) of the works and plant, &c., as shown in the printed balance-sheet to Dec. 31, 1896, is £60,770. The difference between this value and Mr. Newbigging's is due to the action of the 1 per cent. annual charge against revenue for depreciation; the aggregate amount of this being greater than the cost of the extensions and renewals which have been made from time to time. Furthermore, Mr. Newbigging understands, the whole of the retort-mountings and retorts (all excepting the bare retort-stack), are charged to the stock account, instead of to capital. In his valuation all these are included.

The total number of retorts contained in the retort-house is 222. Of these, 162 were in action during last winter; and as the maximum daily make of gas was 996,000 cubic feet, the production per mouthpiece was 6148 cubic feet. Assuming a similar production for the whole of the mouthpieces, the potential capacity of the retort-house is 1,365,000 cubic feet per day, less 15 per cent. (205,000 cubic feet) for reserve. So that the net producing power of the retorts is 1,160,000 cubic feet of gas per day of 24 hours, or close on 16½ per cent. above the maximum daily production of last winter.

A table is next given showing the production and sales of gas both to private consumers and the public lamps during the past eleven years. In 1886, the gas produced was 140,017,000 cubic feet, sold 131,376,400 cubic feet; while in 1896, the respective numbers were 183,412,000 and 175,915,000 cubic feet. The highest figures were reached in 1895, when 187,016,000 cubic feet of gas were produced, and 177,215,600 feet sold. Mr. Newbigging mentions that the average increase in consumption during the past ten years has amounted to only 3 per cent. per annum. But during the past five years, it has fallen to under 1¾ per cent. increase per annum; and last year there was a decrease of 1,300,000 cubic feet. Assuming that the last five years' rate of progression only is maintained, the retort-benches will be sufficient for ten or twelve years. Nearly the whole of the plant and apparatus within the works is in excess of this, and will serve without extension for a larger gas production.

In further remarks on the works, Mr. Newbigging says there is covered storage room for 3000 tons of coal, which is equal to about 60 days' average, or 30 days' maximum consumption. The underground storage capacity for tar and ammoniacal liquor is very ample, being equal to 220,000 gallons, or 60 days' maximum production. As a matter of fact, the retort-house is the least satisfactory feature of the undertaking; and the retort-stack and its mountings are equally behind date. Although fifteen of the benches are on the generator system of firing, and one regenerative, yet the facilities for operating them are not satisfactory. Considerable reconstructions will have to be made sooner or later to put the retort-house and the producing plant into a state of efficiency.

The distributing-mains and service-pipes throughout the district, Mr. Newbigging was, of course, unable to examine. Clearly, however, they are in good order and repair as is proved by the low rate, about 3 per cent., of unaccounted-for gas. The high initial pressure of 30-10ths which is required to be maintained during the hours of heaviest consumption convinces him, however, that enlargements of certain mains are required.

Coming to financial matters, Mr. Newbigging gives some particulars as to profits and dividends. The profit in 1896 amounted to £5397; and interest on loans and maximum dividends, to £5443. The total profit made in the past five years was £25,884; and the interest on loans and maximum dividends, came to £26,857. This shows that the aggregate net profits were £973 short of paying the interest on loans and maximum dividends; and though, as a matter of fact, the interest and maximum dividends have been paid, the Company were enabled to do this by making up the deficiency from the interest received on the invested reserve fund of £8729, and partially from a previously accumulated balance of revenue. This accumulated balance of revenue on Dec. 31, after allowing for the payment of the half-year's dividend, stood at £6225.

Each year's statement of accounts contains, under the head of expenditure, an item for depreciation of works at the rate of 1 per cent. per annum. This, Mr. Newbigging points out, is an unusual allowance in the accounts of statutory gas companies, excepting for works on leasehold land; the works being maintained and renewed year by year out of revenue. The Company, however, claim the right to depreciate the capital value by reason of the schedule to their Special Act of 1865, which sets forth the form of accounts to be used by the Company, and which provides for such depreciation. He also calls attention to the fact that, notwithstanding a charge of 1 per cent. for depreciation, amounting to £609 in the accounts for 1896, the total expenditure on repairs and renewals (including depreciation) is only £3071, or 4·19d. per 1000 cubic feet of gas sold. Now 5d. per 1000 cubic feet is generally admitted to be the average cost of repairs and renewals of a gas-works; and this on 175,915,000 cubic feet gives a sum of £3665, or £594 in excess of what is actually charged. Therefore, in determining the profits of 1896, it will be necessary to reduce the balance shown in the accounts by this latter sum.

The balance of profit for 1896 is shown to be £5397. The cost of repairs and renewals of works, plant, mains, and meters, &c., amounts to £3071 (including depreciation), or 4·19d. per 1000 cubic feet of gas sold. Raising this to 5d., a sum of £594 must be added to the £3071—making it £3665. Deducting the £594 from the £5397 balance of revenue, there is left £4803 as the net profits on the year's working. This net sum of £4803 is, says Mr. Newbigging, what may be designated as the maintainable profits of the concern. Assuming that, in the event of the transfer of the undertaking to the Corporation being carried out, the latter will take over the Company's mortgage debt of £11,790, then the interest payable on this—viz., £513—must be deducted from the net profits of £4803; leaving £4290.

Taking all the circumstances into account, Mr. Newbigging is of opinion that 28 years' purchase of the maintainable profits, less the interest on loans, is the proper multiplier to be used in this instance. Then—

Maintainable profits (less interest on loan) £4290 × 28 =	£120,120
Less, reserve fund, £8729, at present value of 112¾ per cent. Consols	9,842
	£110,278
Add the sum of the loans which the Corporation would take over	11,790
And we have the sum of as the value of the undertaking.	£122,068
To this again has to be added a reasonable sum to cover the costs and expenses of the Company in winding up their affairs, say	1,000
Making a total of	£123,068

Mr. Newbigging next considers how the Corporation would stand in regard to paying interest on the money which would have to be raised by borrowing, and the provision of a sinking fund to redeem the capital in 40 years, as provided by the Corporation Act of 1896. The interest at present payable on the loan of £11,790 averages 4·35 per cent. In the event of a transfer, the mortgagees would probably be willing to accept a reduction of interest. If not, then the Corporation would pay off the present loans and re-borrow at 2¾ per cent.

First, then, there is the purchase amount	£120,120
Less, reserve fund at the present rate of Consols	9,842
	£110,278
Loans on mortgage	11,790
Winding-up expenses	1,000
Cost of procuring loan at 1 per cent.	1,270
Working capital, say	2,662
Total	£127,000

This the Corporation would have to provide. The annual sum required for interest on loans at the rate of 2¾ per cent., and sinking fund to redeem the capital in 40 years, on the 2¾ per cent. basis, would be £5270, or at the rate of 4·15 per cent. per annum. To meet this, there would be the maintainable profits of £4803, and the payment to the Directors of £525 which would be saved; the two together making £5328, or £58 more than the amount of the interest and sinking fund on the money borrowed.

The transfer of the undertaking under the conditions and on the terms set forth, would, in Mr. Newbigging's opinion, be an equitable and favourable one both for the Company and the Corporation. The Company would receive the full value of their works as a going concern; and the Corporation would be able at once to pay their way out of revenue, besides reaping the benefit of the increase of profits due to the future development of the undertaking. That there is room for vast development in the gas consumption in Leamington and the neighbourhood, Mr. Newbigging has no manner of doubt. Only about one-half of the population is supplied with gas. With a little persistent effort and the introduction of prepayment or penny-in-the-slot meters, it would, he thinks, be possible to secure most of the other half as consumers.

Incandescent Gas Lighting for Richmond.—The Richmond Town Council have decided to enter into an agreement with the Gas Company to provide, fix, and maintain incandescent burners in the street lamps for a term of seven years; the Council repaying the initial outlay of £220 *pro ratâ* over the period during which the arrangement exists.

THE PURCHASE OF THE MATLOCK BATH GAS-WORKS BY THE DISTRICT COUNCIL.

The Cost of the Transfer.

In the "JOURNAL" for the 10th inst., we mentioned that a final dividend of £1 6s. 2d. had been paid to the shareholders of the Matlock Bath Gas Company—making £6 6s. 2d. per £5 share—on the winding up of the concern consequent upon the transfer of the works to the District Council. It was then remarked that the market value of the shares before the parliamentary proceedings were entered upon was £10 10s.; so that the amount actually received by the holders as the result of the proceedings showed a considerable drop. The final accounts of the Company present some interesting features to which attention may be drawn, as bearing upon the question of the substitution of some other system than the present for the transfer of gas and water undertakings to local authorities. In the present case, the capital expenditure on the undertaking up to the end of 1896 was £11,932, and a sum of £823 is put down for sundry accounts for gas and residuals; making £12,755. The amount of the purchase-money, as awarded by the Arbitrator (Sir W. Coddington) was originally £16,726; but he subsequently allowed an additional £807 for book debts and sundry stores, making £17,533. The Company therefore received £4778 in excess of the amount at which the undertaking stood in their books. But at what cost? The expenses incurred in connection with the parliamentary and first arbitration proceedings amounted to £2908; and in order to settle the question as to the book debts and stock, for which the Council refused to pay, a further sum of £95 had to be spent. These amounts, with a few miscellaneous payments, made up a total of £3060. Deducting £250 allowed for winding-up expenses, there was left a balance of £2810. When the Liquidator (Mr. J. N. Darbishire, of Nottingham) was appointed last May, the position of the Company was as follows: Their share capital was £10,000; the balance at the credit of the net revenue account for the past year was £589; they had the above-mentioned excess amount of £4778; and there was a sum of £84 for interest—making a total of £15,451. Deducting from this the £2810 expended beyond the amount allowed by Parliament, there was £12,641 to be handed over to the Liquidator. When he commenced his duties there was in the bank and in the Secretary's hands a sum of £11,961; there was subsequently available the further award of £807; and a small amount of interest, £28, accrued by the close of the liquidation—making in all a sum of £12,796 to account for. The cost of the liquidation was £52; sundry creditors received £127; the shareholders were paid a first dividend of £5 per share on 2000 shares, £10,000; and a final dividend, as already mentioned, of £1 6s. 2d., £2617—total, £12,796. We understand that the total costs of both parties exceeded £8000; and they were incurred in connection with the transfer of an undertaking of which the purchase price was less than £17,000.

ELECTRIC LIGHTING NOTES.

The Hampstead Vestry have compensated the widow of the workman White who was killed early this year by a shock received in one of their transformer stations. The matter was recently before Judge Bacon at the Bloomsbury County Court, when the terms of settlement—which had been arranged—viz., £130 to the widow and child, and £30 costs—were submitted to him, and he was asked to allocate the amount between Mrs. White and her son. He gave £70 to the former and £100 to the latter; the money to be invested in the Post Office Savings Bank in the name of the Registrar. The Counsel for the plaintiff (Mr. Marshall Hall) stated in his address to the Judge that the Vestry had behaved both handsomely and honourably in the matter.

The Yorkshire House-to-House Company are making extensive preparations to meet the expected demand for current in Leeds during the coming season. New buildings are rapidly approaching completion; and additional generating plant, consisting of four new Lancashire boilers and four combined engines and dynamos, each of 500 indicated horse power, have been obtained. It is stated that not less than £10,000 is being spent in improving the means of distribution in the centre of the city; and modifications will be made in other important thoroughfares as quickly as circumstances permit. Hitherto all the cables have conveyed current at high pressure; and the conversion to low pressure has been performed by a transformer on the premises of each consumer. Under the scheme of improvement, transformer substations are being constructed at various points, at which the conversion of the current from high to low pressure will be effected.

The current number of the "Electrician" contains the following extract from a paper on "Municipal Lighting" read by Mr. Worth Bean before the National Electric Light Association. It is given as showing how vigorously the question can be discussed on the other side of the Atlantic: "Municipal ownership of electric lighting plants—the most discussed of all the questions of municipal policy—is the more insidious that it comes dressed in the sheep's woolly garb of a philanthropist, which to the uninitiated and ignorant has an alluring and plausible aspect; but to the experienced are plainly visible the wolf's deadly fangs, which have in every instance, sooner or later, lacerated the taxpayer. The authors and promoters of this alluring scheme are either visionary theorists, who have no practical knowledge of its manipulation, or unscrupulous politicians, who, desiring to pose as benefactors to the municipality, hope to ingratiate themselves in the hearts of the voter, and thus secure political plums for themselves and their henchmen. That there are many honest supporters of this political fad who, having been deceived by beautiful, but false, reports from cities which are experimenting with this question, are misled by political demagogues, is undeniable. The tidal wave is sweeping over our land, and certain municipalities are now on the crest; but it will not need the average period of depreciation in a plant for the wave to subside, and leave the wrecks stranded with increased burdens and depleted treasuries. Already cities have sold their plants, paying dearly for their experience, and others are looking for buyers, in order to unload their 'white elephants.' Municipal ownership is contrary to the spirit of republican institutions."

There was a little wrangle at the meeting of the Coventry City Council last Tuesday over a recommendation of the Electric Lighting Committee that £37,900 should be spent in extending their works and mains and in lighting a number of the streets with arc lamps. The proposal was first brought forward at a meeting in July, and then adjourned till last Tuesday. In view of the absence of the Mayor (Alderman Tomson) and other members, Alderman Hill moved that the question be adjourned for a month. Alderman Andrews, the Chairman of the Gas Committee, objected to the adjournment. He desired the report withdrawn, and a new, as also a more economical scheme, presented by the Committee. The suggestion for adjournment was negatived by 12 votes to 11. Mr. T. Horton was rebuked by Alderman Hill for insinuating that the members of the Electric Lighting Committee had run away from their duties. As Chairman of the Committee, he had left London at personal inconvenience to attend the meeting. Mr. Bond moved, and Mr. Lee seconded, a proposal that the report be referred back, in order that a modified scheme might be presented. Mr. James asserted, in no measured terms, that many members of the Council and very many ratepayers were dissatisfied with what they considered an extravagant scheme. Why, he asked, should £1200 be spent on commission to a Consulting Engineer when the Corporation had an Engineer capable of preparing the scheme? Alderman Andrews attacked the Committee's scheme. He said that other towns' experience was a succession of losses. A railway siding was proposed for the electric-light works, but refused to the gas-works, where the traffic was much greater. Was not that out-Heroding Herod? Alderman Hill thought the Council would have coincided with the Committee in their desire to postpone the consideration of the matter. However, the Council resolved that the report should be referred back.

The fifth annual report of the Electricity Committee of the Glasgow Corporation, which has lately been issued, states that the gross revenue in the financial year ending May 31 amounted to £30,474, and the gross expenditure to £12,475, to which there was added a sum of £10,705, depreciation written off capital; leaving a balance of £7293 on the profit and loss account. The Committee had to meet the interest on loans, £4300, and the sinking fund, £1466—together £5766; leaving a balance of £1527. The balance is, in accordance with section 52 of the Glasgow Corporation Electric Lighting Order, 1890, transferred to the credit of the gas account, to meet the deficit in connection with the Electricity Department for the year 1895, which was borne by the Gas Department. The report goes on to state that, in order to place the works in as favourable a position as possible, the Committee have taken advantage of the gratifying result of the year's operations to transfer from revenue to capital, in the way of depreciation on the machinery and plant at the John Street and Waterloo Street stations, and on meters, in addition to the usual amounts, the sum of £4500, which is included in the above-named sum of £10,705. Taking into consideration the satisfactory balance now presented, they recommend that, on the principle agreed to by the Corporation last year, the price to those consumers whose quantity does not exceed the maximum demand, as shown on the indicator in their premises, should be continued at 6d. per Board of Trade unit; that for all current taken over the maximum demand, at 100 volts pressure, the price be reduced from 4d. to 3d. per unit; and that for current taken over the maximum demand, at 200 volts pressure, the price be reduced from 4d. to 2¾d. per unit—these reductions to take effect retrospectively as from the 1st of June last. They further recommend that for the current year the price charged to the Watching and Lighting Committee for street lamps be reduced to £18 per lamp. The number of meters in use on May 31 was 1090; being an increase of 235 over the number at the same date in 1896. The quantity of electricity sold during the past year to private consumers was 1,287,418 Board of Trade units; being 45·2 per cent. more than in the preceding year. This increased consumption is largely due to the demand during the latter months of the financial year, when the benefit of the rebate under the present system of charging had been recognized by the consumers. During the past year new boilers, engines, and dynamos, to the extent of 700-horse power, were added to the works at the Waterloo Street station, with the switching gear necessary for these additions; making a total of 3300-horse power at that station. To meet the increased demand anticipated during the ensuing winter, two large storage batteries are being erected. These are expected to be working by the end of September; and they will add 25 per cent. to the maximum output of the present plant.; During the year new mains to the extent of about eight miles were laid in order to meet the increasing demand for electricity. The maximum demand made on the station in Waterloo Street at any one time throughout the year was 1,776,000 watts; and the largest output in 24 hours was 12,985 units.

METROPOLIS WATER SUPPLY.

The Government Bill as Passed.

We have reported in our "Parliamentary Intelligence" the several amendments introduced into the Metropolitan Water Companies Bill in Committees of the two Houses. The text of the measure, which has been published as an Act, is as follows:—

1.—(1) Any water consumer or any local authority may complain to the Railway and Canal Commission that any of the Metropolitan Water Companies has failed to perform some statutory duty of the Company; and the Commission may hear and determine that complaint, and if satisfied of such failure, order the Company, within the time limited by the order, to fulfil the duty, and may, if they think fit, by any such order impose any penalty for such failure which can be imposed under any Act, and enforce any such order in like manner as any other order of the Commission. (2) If at any time complaint as to the quantity or quality of the water supplied by any of the Metropolitan Water Companies for domestic use is made to the Railway and Canal Commission, by any water consumer or local authority, the Commission may hear and determine such complaint, and if satisfied that the complaint is well founded, may order the Company, within such reasonable time as is specified in the order, to remove the ground of such complaint, and may enforce such order in like manner as any other order of the Commission, and may award damages to the complainant. (3) All enactments relating to the Railway and Canal Commission, except section 2 of the Railway and Canal Traffic Act, 1894, which restricts the power to award costs, shall, with the necessary modifications, apply to the Railway and Canal Commission for the purpose of their jurisdiction under this Act. (4) This Act shall

be in addition to, and not in substitution for, any existing proceedings or remedy.

2.—A local authority may aid any water consumer in obtaining the determination of any question which appears to the local authority to be of interest to water consumers within the district of such local authority with respect to the rights, duties, and liabilities of any of the Metropolitan Water Companies in reference to the quantity or quality of water supplied, or the charges made by them. A local authority aiding any legal proceedings under this section may, if the Court think fit, be made a party to the proceedings, and shall be liable for costs accordingly.

3.—The Metropolis Water Act, 1852, and the Metropolis Water Act, 1871, shall, as respects the Metropolitan Water Companies, extend to the whole of the area within which any of the Companies is for the time being authorized to supply water; and for the purpose of the said Acts as so extended, reference to that area shall be substituted for references to "the Metropolis" and "the limits of this Act;" and as respects any area outside the Administrative County of London, a reference to the Council of a county or county borough shall be substituted for a reference to the Metropolitan Authority, and so much of the said Acts or of any Local Act as is inconsistent with such substitution shall be, and is hereby repealed.

4.—The Railway Commissioners shall include in their annual report a return of all proceedings taken before them under this Act.

5.—In this Act, unless the context otherwise requires, the expression "Metropolitan Water Companies" means the Water Companies specified in section 3 of the Metropolis Water Act, 1871—viz., the New River Company, the East London Water-Works Company, the Southwark and Vauxhall Water Company, the Company of Proprietors of the West Middlesex Water-Works, the Company of Proprietors of the Lambeth Water-Works, the Governor and Company of the Chelsea Water-Works, the Grand Junction Water-Works Company, and the Company of Proprietors of the Kent Water-Works. The expression "water consumer" means any person who is supplied with water by any of the Metropolitan Water Companies, or who pays, or is liable to pay, any money charged by any of those Companies for or in respect of the supply of water, whether under the name of rent, rate, or otherwise, and includes any householder or owner or occupier of a house entitled to make a communication with the mains or pipes of any of those Companies: Provided that nothing in this Act shall affect the terms of any agreement existing at the time of the passing of this Act between a water company and a water consumer as to the supply of water. The expression "local authority" means the Council of any county, borough, or district, the Mayor, Aldermen, and Commonalty of the City of London, and any Vestry, District Board, or Local Board of Health in the County of London.

6.—(1) This Act may be cited as the Metropolis Water Act, 1897. (2) This Act shall come into operation on the first day of September next after the passing thereof.

The Public Lighting of Aldeburgh.—The difficulty in regard to this matter, to which reference was made in the "JOURNAL" a few weeks ago, has been overcome by the decision of the Town Council to light the streets by oil; and the contract has been placed with Messrs. Defries.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Mr. John S. Gibb, the Treasurer to the Edinburgh and Leith Gas Commission, has issued his annual detailed abstract of the accounts of the Commission for the year from May 16, 1896, to May 15, 1897, inclusive. For the first time the results of the working at the Portobello Gas-Works are included; but these are only for the half year from Nov. 11. It is shown that of the total outlay upon coal, amounting to £91,272, there was expended upon 108,606 tons for the Edinburgh works, £62,166; upon 51,416 tons for the Leith works, £27,534; and upon 2795 tons for the Portobello works, £1571. Of a total expenditure of £4510 upon lime, 5067 tons for the Edinburgh works cost £2886; 2739 tons for the Leith works cost £1556; and 113 tons for the Portobello works cost £68. The total cost of purifying materials, oil, water, and sundries used at works was £8390, of which £5564 was spent in the Edinburgh works; £2621 in the Leith works; and £205 in the Portobello works. Salaries and wages amounted to £39,896, of which £25,297 was expended in the Edinburgh works; £13,952 in the Leith works; and £646 in the Portobello works. Repairs and maintenance of works and plant cost £16,520, of which £6685 was for wages, and £9835 for materials and tradesmen's accounts. Discounts and abatements to consumers amounted to £2988; bad debts to £35; and gas used on works and offices, or supplied free of charge, to £1566. The gross cost of gas amounted to 24s. 10·88d. per ton of coal carbonized; to 2s. 5·24d. per 1000 cubic feet of gas made; and to 2s. 8·07d. per 1000 cubic feet sold; leaving a proportion of 2·83d. to lost gas. In the manufacturing department, the gross cost of gas was 19s. 2·07d. per ton of coal used, of which 11s. 2·54d. was required per ton of coal, being at the rate of 1s. 1·16d. per 1000 cubic feet made, and 1s. 2·44d. per 1000 cubic feet of gas sold, leaving 1·28d. applicable to lost gas. Purification cost 1s. 0·37d. per ton of coal used, 1·21d. per 1000 cubic feet of gas made, and 1·33d. per 1000 cubic feet sold, leaving 0·12d. applicable to lost gas; salaries in works cost 3·44d. per ton of coal used, 0·34d. per 1000 cubic feet of gas made, and 0·37d. per 1000 cubic feet sold, leaving 0·03d. applicable to lost gas; wages in works cost 4s. 7·37d. per ton of coal used, 5·41d. per 1000 cubic feet of gas made, and 5·94d. per 1000 cubic feet sold, leaving 0·53d. applicable to lost gas; and repairs and maintenance cost 2s. 0·35d. per ton of coal used, 2·39d. per 1000 cubic feet of gas made, and 2·61d. per 1000 cubic feet sold, leaving 0·22d. applicable to lost gas. Distribution cost 3s. 3·95d. per ton of coal used, 3·91d. per 1000 cubic feet of gas made, and 4·29d. per 1000 cubic feet sold, leaving 0·38d. applicable to lost gas. Management cost 10·68d. per ton of coal used, 1·04d. per 1000 cubic feet of gas made, and 1·14d. per 1000 cubic feet sold, there being 0·10d. applicable to lost gas. There was received for coke £6206, which was at the rate of 9·15d. per ton of coal used, 0·90d. per 1000 cubic feet of gas made, and 0·98d. per 1000 cubic feet sold, there being 0·08d. applicable to lost gas. There was received for waste lime £72, which was at the rate of 0·11d. per ton of coal manufactured, 0·01d. per 1000 cubic feet of gas made, and 0·01d. per 1000 cubic feet sold. There was received for tar £14,576, which was at

GAS AND WATER COMPANIES' STOCK AND SHARE LIST (see ante, p. 427).

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	9 Apl.	10½	Alliance & Dublin 10 p. c.	24–25	+½	4 4 0
100,000	10	,,	7½	Do. 7 p. c.	17–18	−½	4 3 4
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	106–108	..	4 12 8
200,000	10	27 May	7	Belgrano (B. Ayres), Limited	9½–10	..	7 0 0
100,000	Stck.	29 June	5	Do. 5 p. c. Deb. Stk	103–106	..	4 14 4
200,000	5	27 May	6½	Bombay, Limited	6¾–7¼	..	4 9 7
40,000	5	,,	6½	Do. New, £4 paid	5¾–5¾	..	4 10 7
380,000	Stck.	26 Feb.	12	Brentford Consolidated	300–305	..	3 18 8
240,000	,,	,,	9	Do. New	223–228	..	3 18 7
50,000	,,	,,	5	Do. 5 p. c. Pref.	145–150	..	3 6 8
159,375	,,	11 June	4	Do. 4 p. c. Deb. Stock.	135–139	..	2 17 6
220,000	Stck.	26 Mar.	11½	Brighton & Hove Original	273–278	..	4 2 8
208,820	,,	,,	8½	Do. A Ord. Stk.	201–206	..	4 2 6
933,500	Stck.	26 Feb.	5	Bristol, 5 p.c. max.	130–135	..	3 14 1
420,000	20	26 Mar.	11½	British	56–57	..	3 18 11
50,000	10	26 Feb.	11½	Bromley, Ordinary 10 p. c.	23–25	..	4 12 0
71,000	10	,,	8½	Do. 7 p. c.	18–20	..	4 5 0
500,000	10	28 Apl.	6	Buenos Ayres (New) Limited	10¾–11½	..	5 4 4
200,000	100	1 July	6	Do. 6 p. c. Deb.	—	..	—
150,000	20	15 July	8½	Cagliari, Limited	30–32	..	5 3 1
100,000	10	11 June	8	Cape Town & District, Ltd	16¾–17½	..	4 11 8
50,000	50	3 May	6	Do. 6 p. c. 1st Mort.	58½–59½	..	5 0 10
550,000	Stck.	9 Apl.	13½	Commercial Old Stock	343–348	..	3 17 6
165,020	,,	,,	10¼	Do. New do.	257–262	..	4 0 1
165,000	,,	11 June	4½	Do. 4½ p. c. Deb. do.	155–158	..	2 16 11
800,000	Stck.	11 June	13	Continental Union, Limited.	255–260	..	5 0 0
200,000	,,	,,	10	Do. 7 p. c. Pref.	213–218	..	4 11 8
51,600	Stck.	26 Feb.	14	Croydon Com'cial A 10 p. c.	317–322	..	4 6 11
163,400	,,	,,	11	Do. B 7 p. c.	255–260	..	4 4 7
535,000	Stck.	12 Aug.	5¼	Crystal Palace Ord. 5 p. c. Stk	137–140	..	3 15 0
60,000	,,	,,	5	Do. 5 p. c. Pref.	140–143	..	3 9 11
486,090	10	29 July	11	European, Limited	24¾–25¼	..	4 6 3
354,060	10	,,	11	Do. £7 10s. paid	17½–18½	..	4 9 3
5,896,590	Stck.	12 Aug.	12¾	Gaslight & Coke, A, Ordinary	312–315*	−1	4 0 11
100,000	,,	,,	4	Do. B, 4 p. c. max.	113–118	..	3 7 10
665,000	,,	,,	10	Do. C, D, & E, 10 p. c. Pf.	315–320	..	3 2 6
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	150–155	..	3 4 6
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	220–225	..	3 6 8
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	202–207	..	3 7 8
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	315–320	..	3 2 6
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	180–185	..	3 4 10
1,061,150	,,	11 June	4	Do. 4 p. c. Deb. Stk.	138–141	..	2 16 9
294,850	,,	,,	4½	Do. 4½ p. c. do.	155–158	..	2 16 11
908,000	,,	,,	6	Do. 6 p. c. do.	207–212	..	2 16 7
70,000	10	13 May	6	Hongkong & China, Limited	13½–14½	..	4 2 9
£			p. c.	GAS COMPANIES.			£ s. d.
3,800,000	Stck.	13 May	10	Imperial Continental	213–218	..	4 11 8
376,400	100	3 Aug.	4	Do. 4 p. c. Debs. Red.	99–102	..	3 18 5
473,600	Stck.	12 Aug.	3½	Do. 3½ p. c. Deb. Stk ,,	103–106	..	3 6 0
75,000	5	29 June	6	Malta & Mediterranean, Ltd.	5¾–6	..	5 0 0
560,000	100	1 Apl.	5	Met. of Melbourne, 5p. c. Deb.	112–114	..	4 7 8
250,000	100	,,	4½	Do. 4½ p. c. Debs.	108–110	..	4 1 10
541,920	20	11 June	5	Monte Video, Limited	15–16	..	6 5 0
150,000	5	27 May	8	Oriental, Limited	8¼–8¾	..	4 11 5
135,000	5	,,	8	Do. New, £4 10s. paid	7¼–7¾	..	4 12 10
15,000	5	,,	8	Do. do. 1879, £1 paid	1⅞–2	..	4 0 0
60,000	5	26 Mar.	7	Ottoman, Limited	4¾–5¼	..	6 13 4
420,000	100	3 May	6	People's Gas } 1st Mtg. Bds.	104–109	..	5 10 1
500,000	100	1 June	6	of Chicago } 2nd Do.	105–110	..	5 9 1
250,000	10	27 May	10	San Paulo, Limited	14¾–15½	..	6 9 0
5,475,000	Stck.	12 Aug.	5¼	South Metrop., 4 p.c. Ord.	145–148*	+1	3 10 11
1,416,667	,,	15 July	3	Do. 3 p.c. Deb. Stk.	105–109	..	2 15 0
60,000	Stck.	12 Mar.	11½	Tottenham & Edmonton, A	275–285	..	4 0 10
60,000	,,	,,	8½	Do. B	190–200	..	4 5 0
182,380	10	27 May	10	Tuscan, Limited	13¾–14¾	..	6 18 0
149,900	10	1 July	5	Do. 5 p.c. Debs. Red.	100–103	..	4 17 1
				WATER COMPANIES.			
746,159	Stck.	29 June	10½	Chelsea, Ordinary	335–339	..	3 1 10
150,000	,,	,,	5	Do. 5 p. c. Pref.	177–180	..	2 15 6
160,000	,,	,,	4½	Do. 4½ p. c. Pref. Stk., 1875	157–160	..	2 16 3
175,785	,,	26 Mar.	4½	Do. 4½ p. c. Deb. Stock	160–165	..	2 14 6
1,720,560	Stck.	9 Apl.	7	East London, Ordinary	224–228	−1	3 1 4
554,740	,,	29 June	4½	Do. 4½ p. c. Deb. Stk.	163–166	..	2 14 3
390,000	,,	,,	3	Do. 3 p. c. Deb. Stk.	106½–107½	..	2 15 10
700,000	50	11 June	7½	Grand Junction, 10 p.c. max.	120–125	..	3 0 0
295,000	Stck.	26 Mar.	4	Do. 4 p. c. Deb. Stk.	148–153	..	2 12 4
708,000	Stck.	12 Aug.	13	Kent	348–353*	+1	3 13 7
160,000	,,	,,	7	Do. New, 7 p. c. max.	210–215	..	3 5 1
1,043,800	100	29 June	9½	Lambeth, 10 p. c. max.	287–292	+2	3 6 9
406,200	100	,,	7½	Do. 7½ p. c. max.	217–222	..	3 7 7
350,000	Stck.	26 Mar.	4	Do. 4 p. c. Deb. Stk.	147–150	..	2 13 4
500,000	100	12 Aug.	13	New River, New Shares.	435–440*	+3	2 19 1
1,000,000	Stck.	29 July	4	Do. 4 p. c. Deb. Stk.	151–154	..	2 11 11
902,300	Stck.	29 June	5	S'thwk & V'xhall, Ordinary	160–163	..	3 1 3
126,500	100	,,	5	Do. Do. 7½ p. c. Max.	151–154	..	3 4 11
489,200	Stck.	,,	5	Do. Do. 5 p. c. Pref.	173–178	..	2 16 2
1,019,585	,,	9 Apl.	4	Do. 4 p. c. A Deb. Stk.	145–148	..	2 14 2
1,155,066	Stck.	11 June	10	West Middlesex	312–317	..	3 3 1
200,000	,,	,,	4½	Do. 4½ p. c. Deb. Stk.	163–166	..	2 14 3

*Ex div.

the rate of 1s. 9·48d. per ton of coal used, 2·10d. per 1000 cubic feet of gas made, and 2·31d. per 1000 cubic feet sold, there being 0·21d. applicable to lost gas. The total receipts from residuals amounted to £20,854, which was equal to 2s. 6·74d. per ton of coal used, 3·01d. per 1000 cubic feet of gas made, and 3·30d. per 1000 cubic feet sold, there being 0·29d. applicable to lost gas. There were miscellaneous receipts amounting to £404, and adding these to the returns from residuals the sum is raised to £21,258, which is equal to 2s. 7·33d. per ton of coal used, 3·06d. per 1000 cubic feet of gas made, and 3·36d. per 1000 cubic feet sold, there being 0·30d. applicable to lost gas. The gross cost of gas was £202,759; and deducting the £21,258, the net cost is found to have been £181,501, which is equal to 22s. 3·55d. per ton of coal used, 2s. 2·18d. per 1000 cubic feet of gas made, and 2s. 4·71d. per 1000 cubic feet sold, there being 2·53d. applicable to lost gas. The total revenue from gas was £222,072, which was equal to 27s. 3·35d. per ton of coal used, 2s. 8·03d. per 1000 cubic feet of gas made, and 2s. 11·13d. per 1000 cubic feet sold, there being 3·10d. applicable to lost gas. The gross profit amounted to £40,570, which was equal to 4s. 11·80d. per ton of coal used, 5·85d. per 1000 cubic feet of gas made, and 6·42d. per 1000 cubic feet sold, there being 0·57d. applicable to lost gas. Annuities payable by the Commissioners (including £274 redeemed) amounted to £34,600, which was equal to 4s. 3·02d. per ton of coal used, 4·98d. per 1000 cubic feet of gas made, and 5·47d. per 1000 cubic feet sold, there being 0·49d. applicable to lost gas. Interest on money borrowed, and on mortgages redeemed and expenses of mortgages, came to £6014, which was equal to 8·86d. per ton of coal used, 0·87d. per 1000 cubic feet of gas made, and 0·95d. per 1000 cubic feet sold, there being 0·08d. applicable to lost gas. The average price of coal in the Edinburgh works was 11s. 5·38d. per ton; in the Leith works, 11s. 2·94d.; and in the Portobello works, 11s. 2·54d. The make of gas was, in the Edinburgh works, 1,097,015,000 cubic feet, equal to a yield of 10,101 cubic feet per ton of coal; in the Leith works, 544,932 cubic feet, equal to 10,598 cubic feet per ton of coal; and in the Portobello works, 22,200,500 cubic feet, equal to 8150 cubic feet per ton of coal. The gas sold was from the Edinburgh works, 979,163,500 cubic feet, equal to 9016 cubic feet per ton of coal, and 89·26 per cent. on make; from the Leith works, 508,122,000 cubic feet, equal to 9882 cubic feet per ton, and 93·24 per cent. on make; and from the Portobello works, 19,214,900 cubic feet, equal to 7054 cubic feet per ton of coal, and 86·55 per cent. on make. Taking into account gas used on works, &c., the total quantity accounted for was, in the Edinburgh works, 985,860,100 cubic feet, equal to 89·87 per cent. on make; in the Leith works, 511,653,300 cubic feet, equal to 93·89 per cent. on make; and in the Portobello works, 19,425,700 cubic feet, equal to 87·50 per cent. on make. The gas unaccounted for was, in the Edinburgh works, 111,154,900 cubic feet, equal to 10·13 per cent. on make; in the Leith works, 33,278,700 cubic feet, equal to 6·11 per cent. on make; and in the Portobello works, 2,774,800 cubic feet, equal to 12·50 per cent. on make. The total unaccounted-for gas amounted to 147,208,400 cubic feet, equal to 8·85 per cent. on make. The average illuminating power of the gas was, in the Edinburgh works, 25·23 candles; in the Leith works, 25·28 candles; and in the Portobello works, 26·92 candles—a general average, in all the three works, of 25·26 candles. The price of gas during the whole of the year dealt with was 3s. per 1000 cubic feet. These figures make dry, but doubtless very interesting, reading. Their preparation must have cost Mr. Gibb a vast amount of trouble—for even the compilation of this summary has been to me a work of some care. But they are, like everything else which comes through Mr. Gibb's hands, thoroughly accurate and in every respect reliable.

The annual accounts of the Gas Department of the Corporation of Glasgow were presented at a meeting of the Corporation on Thursday, and without much ceremony were adopted. That is the fashion in the Town Council of Glasgow, where the intransigeants are allowed to say their say, and no more notice is taken of their speech. The few remarks which were made, brought out very forcibly the necessity for further extension of the gas-works. A new works is contemplated, and there appears to be every prospect of its erection being proceeded with at an early date.

On Tuesday, the Greenock Police Board adopted the estimate of Mr. S. Stewart, the Corporation Gas Engineer, of the income and expenditure for the current year. The revenue is expected to amount to £31,280, and the expenditure to £40,120, leaving a surplus of £324. The price of gas has been retained at 3s. 1½d. per 1000 cubic feet.

The Forfar gas accounts for the past year were before the Corporation on Monday, and the conversation which took place upon them was quite characteristic. Mr. Craik, the Convener of the Gas Committee of the Corporation, moved the approval of the accounts, subject to the condition that £200, to be applied towards repayment of a temporary loan of £1200, be deposited in the bank separately, and that no sums be voted to the contingent or sinking funds unless by a written order of the Corporation or Committee. Mr. Christie, who is "the old man of the sea" of the Corporation, in, metaphorically, taking off his coat for the customary fray, intimated that he had again to criticize the accounts very severely. So far as I can gather, the taking off of his coat was the principal part of Mr. Christie's performance, as it so often is with self-appointed champions. Without giving any figures in support of his statement, he complained that the Gas Manager had under-estimated the cost of coal during the past year by £600, and that £718 which had been charged against the contingent fund, should have been charged against revenue. He thought that instead of a surplus, the accounts should show a deficiency of £70. Well, all this may be true; but Mr. Christie did not show from the accounts that it was so. Anyone can throw out an assertion, but it requires proof of some sort to establish it, and there was nothing of that kind here. Indeed, it was pointed out by Provost M'Dougall that for about twenty years very little was spent upon the maintenance or extension of the gas-works, but that within the past two or three years between £2000 and £3000 had been so expended; and it was further pointed out that within the past few years the arrears due for gas had risen from £50 to £180. Just so; if the Corporation neglected the gas-works for a long series of years, they must expect heavier outlay for some time before they get them into proper order. This would account for the decrease of the contingent fund from nearly £3000 to

CARBURETED WATER-GAS APPARATUS

MERRIFIELD—WESTCOTT—PEARSON PATENTS.

THE

ECONOMICAL GAS APPARATUS CONSTRUCTION Co., Ld.

W. H. PEARSON, President.
W. H. PEARSON, Junr., Vice-President.
J. T. WESTCOTT, M.E., Manager.
L. L. MERRIFIELD, M.I.M.E., Chief Engineer.

London Offices: SUFFOLK HOUSE, LAURENCE POUNTNEY HILL, E.C.
American Offices: TORONTO.

TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

Carbureted Water-Gas Engineers.

"New Swindon Gas Company,
INCORPORATED UNDER 56 VICT., CH. 29.

"JOHN J. JERVIS,
"Secretary and Manager.

28/6/1897.

"Messrs. THE ECONOMICAL GAS APPARATUS CONSTRUCTION COMPANY, LTD.

"DEAR SIRS,—I feel that it is now our duty to express our opinion upon the Water-Gas "Plant erected by you for this Company, and started in February last. We were satisfied "then with the Workmanship and Materials; and now, after Five Months of Continuous "Working, we have much pleasure in stating that the working of the Plant and the results "attained are very satisfactory indeed.

"I am, yours faithfully,
"(Signed) JOHN J. JERVIS,
"Secretary and Manager."

"J. T. WESTCOTT, Esq.

N.B.—The M.-W.-P. Plant is built under penalty to Manufacture Gas on less Raw Material than any other Plant on the Market.

All Enquiries to be Addressed to the Company's Offices.

£1060. I am not concerned to defend the action of the Gas Committee in charging the cost of the extensions and improvement of the works upon the contingent fund. It may or may not be good finance. All I say is the outlay was inevitable; and I go further, and say that criticism of accounts, which only consists of fault-finding, not to say denunciation, without pointing out a better way of doing the thing complained of, is worse than worthless—it arouses a spirit of discontent in the community, and does nothing, assuming a wrong to exist, to put it right. On this occasion, after the disturbing words had been said, the accounts were approved, it was agreed to transfer £437 to the contingent fund, the estimates for the current year were agreed to, and it was resolved to retain the price of gas at 3s. 9d. per 1000 cubic feet, all as would have been done had no croaking been indulged in by Mr. Christie and his followers. The Committee are to discuss the future finances of the Corporation, as a matter which necessarily requires attention now the gas-works have been got into something like ship-shape order.

The Kirriemuir Gaslight Company on Tuesday of this week inaugurated a new retort-bench, which has been erected on the regenerative system according to plans and specifications by Mr. C. P. Myers, the Company's Manager. Mr. John Ogilvy, the Chairman of the Company, performed the ceremony of charging the first retort. Mr. Myers was congratulated, as he deserved to be, on the completeness of the installation, and on the ability which he had manifested in designing and superintending the erection of the bench.

The electric light explosion fiend has again made its appearance, this time in Edinburgh. About eight o'clock last Sunday evening, the pavement of the footpath on the west side of Charlotte Square was thrown up by an explosion in the culvert carrying the electric light cables. Gas was supposed to have got into the culvert from an escape in one of the houses in the square. For some time a blue light burned at the crevices between the flagstones; but a heavy shower of rain which came on, extinguished the flame. Since the advice was given to fill up electric light manholes with an inert substance and to make the covers air-tight, explosions have been almost unknown. It is significant of the excellence of the advice to say that on this occasion, while paving stones were displaced, the cemented manhole covers remained undisturbed. I suppose it would be in order to prevent a recurrence of disaster that the electric current was cut off for the night in Charlotte Square. This was a wise precaution; but it would be an unfortunate feature of electric lighting should it be found necessary, every time a slight local defect occurs, to throw a whole district into darkness. Since writing the above, I have learned that the Electric Lighting Committee attribute the explosion to a faulty cable having caused short circuiting and fired the gas. The Gas Commissioners make the following explanation, which gives the whole subject a more serious aspect: "The primary cause of the accident was a defective electrical cable allowing the electrical energy to gain access to a ¾-inch brass gas-main tap, which was situated beneath the pavement in the vicinity of the defective cable. The electrical fluid attacked the brass tap, first permitting the escape of coal gas, but ultimately sealing up the iron pipe, by the fusion of the metals composing the brass tap, and the running of the liquid into the bore of the pipe. The electrical energy was also sufficient to fuse and slag the earth and stone in the immediate vicinity; and it was also the electric fluid that caused the cast-iron cover to become red hot. The loud hissing noise of the flames doubtless arose from the fusion of the metals, copper and zinc, and the absolute destruction of the latter, combined with the burning gas; and the explosions in the junction boxes would arise from the ingress of the escaping coal gas into the electrical conduits. Or it is also possible that the gas may have been generated from the destruction of the insulating material on the electric cables, this gas igniting where the fire originally broke out."

The Greenock Police Board have this week fixed the domestic water-rate for the current year at 6d. per £1, and the public water-rate at 1d. per £1, both of which rates are the same as those in force last year. The revenue last year amounted to £19,499, and the surplus to £95. For the current year the estimated revenue is £19,601, and the estimated surplus £311.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 21.

Sulphate of Ammonia.—The market has displayed rather more activity during the week; a fairly good export inquiry having set in. But the volume of actual business put through does not appear to have been commensurate to the inquiry. As usual at this time of the year, the production is light; and available supplies being reduced to a limited compass, values are very sensitive, and readily respond to any increase in the demand. But the disposition shown on the part of some makers to slightly advance their quotations, appears in this case to have had the effect of checking business. Buyers are very shy; and the attempt to realize enhanced values seems to have frightened them off, so that at the close of the week the inquiry has somewhat subsided. The chief business was transacted at the old rates. Quotations to-day are £7 10s. to £7 11s. 3d. per ton f.o.b. Leith, £7 10s. Hull, and £7 11s. 3d. Liverpool. For forward delivery, buyers have been rather more ready to enter into engagements; but as a rule their ideas of price were too much at variance with those of sellers to admit of business.

Nitrate of Soda.—The tendency is rather easier at 7s. 3d. to 7s. 4½d. per cwt. for ordinary quality, and 7s. 6d. for fine.

LONDON, *Aug.* 21.

Tar Products.—The utter collapse in the market value of anthracene seriously affects the value of tar. It has taken some time for distillers to find out that the distillation of anthracene drainings, anthracene oil, or green oil, to recover the anthracene left in them, can only be done by an expenditure much in excess of the money resulting therefrom. The effect of the universal cessation of this redistillation, will be the reduction of at least one-third of the production of anthracene, which should eventually materially influence the price obtainable. This may occur sooner than might be generally expected, since the improved demand for

JOSEPH AIRD,
WELLINGTON TUBE WORKS,
GREAT-BRIDGE,
STAFFORDSHIRE.

HIGHEST QUALITY
TUBES AND FITTINGS
GAS, STEAM, WATER, GALVANIZED TUBES and FITTINGS in all Sizes.

LARGE SIZED TUBES FOR "COLLIERIES," FITTED WITH JOSEPH AIRD'S PATENT DOUBLY SECURE FLANGED JOINT, OR JOSEPH AIRD'S PATENT "EXPRESS" LOCK-JOINT.
TUBES MADE LAPWELDED ALL SIZES TO TWELVE INCHES.

Illustrated Price Lists on Application.

LONDON OFFICES: 46, QUEEN VICTORIA STREET, E.C.

alizarine is accentuating itself just now in a marked manner, and it is pretty well admitted that alizarine makers have only small stocks of anthracene. Tar oils keep firm, and continue scarce. Pitch drags its weary course, with no apparent ray of hope in front. Whether the advent of the shipping season will bring a better feeling, remains to be seen. Benzols hang in the balance, and are not likely to change for the better until the rumours of vast additions to coke-oven plants in Germany and elsewhere are discounted. Toluol is firm, and improving. Naphthalene in all its positions is dull. Solvent naphtha is good; and crude is in fair demand. Generally, however, the market is of a holiday character. To-day's values are: Tar, 17s. to 21s. Pitch, 17s. to 21s. 6d. Benzols, 90's, 2s.; 50's, 2s. Toluol, 2s. 4d. Solvent naphtha, 1s. 7d. Crude, 30 per cent., naphtha, 11d. Creosote, 2¼d. Liquid, 3d. Heavy oils, 45s. Carbolic acid, 60's, 2s. Naphthalene, 40s.; salts, 20s. Anthracene, "A" quality, 6d.; "B" quality, 5d.

Sulphate of Ammonia is better. As much as £7 12s. 6d has been paid; while a large business is reported at £7 11s. 3d.—always less 3½ per cent. discount, delivered f.o.b., bags included. Makers are much firmer in their ideas; and for forward business, as much as £8 is asked, though this price has been shaded in one notable instance. The future of sulphate is more encouraging; and the hand of the new Sulphate of Ammonia Committee is likely to be felt more than is supposed in this so long indifferent market. Fortunately for makers, the bear element has entirely taken fright at the moment, though they may return at any time with their hateful influence.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—Business continues to drag on through the summer season now rapidly approaching a close, and pits are still not working more than four, and in many cases three, days per week, with the output in excess of requirements, and stocks accumulating heavily in some instances. House coals are not yet meeting with any inquiry beyond the smallest summer requirements. The strike in the engineering trades is beginning to throw some of the lower qualities of round coal on the market, and all descriptions are just at present difficult to move. Except, however, for occasional special clearance sales, quoted rates are generally unchanged. At the pit mouth, best Wigan Arley averages 9s. 6d. to 10s.; Pemberton four-feet and seconds Arley, 8s. to 8s. 6d.; common house coal, 6s. 6d. to 7s.; and steam and forge coal, 5s. 9d. to 6s. 3d. per ton. The small output of engine fuel moves off readily; but there is not so much pressure of demand, and the outlook is not quite so satisfactory—colliery proprietors not being able to more than maintain late rates, which at the pit mouth average 3s. 3d. to 3s. 6d. for common slack; 3s. 9d. to 4s. 3d. for medium sorts; and 4s. 6d. to 4s. 9d. for best qualities. The shipping demand for steam coal continues good, and 7s. 6d. to 7s. 9d. has been obtained for ordinary kinds, delivered at the Garston Docks or the High Level, Liverpool.

Northern Coal Trade.—There is a decided activity in the coal trade of this district; and prices all round seem to be firmer—the shipments being very heavy, and the consumption locally showing signs of further increase. Best Northumbrian steam coals are steady at from 8s. 9d. to 8s. 10½d. per ton f.o.b.; second class steam coals are quoted at 8s. 3d.; and steam smalls, 3s. 6d. to 3s. 9d. There is much unrest at the present time in the steam coal trade of Northumberland; and the strained position between employers and miners is watched with some anxiety. In the Durham coal trade, there is an increasing demand; and prices are firmer both for gas and household coals. In the gas coal trade there is an increasing demand; and the price is well maintained. One of the largest of the producing firms in Durham now asks an increased price. Generally the quotation is from 7s. 6d. to 8s. per ton f.o.b. There are, however, many contracts running at much lower prices; and there is some ground for the belief that the contract for the Darlington Gas-Works has been renewed without advance on the previous year's figures. Manufacturing coal is quieter, and that without much reduction in the consumption as yet through the strike. In gas coke, there is no alteration in prices; but the stocks begin to increase at some inland works.

Scotch Coal Trade.—Trade remains without much change. The volume of business continues good, but prices are scarcely altered. The quotations are: Main, 6s. 9d. per ton, f.o.b., Glasgow; ell, 7s. to 7s. 6d.; and splint, 7s. to 7s. 3d. The shipments for the week amounted to 193,132 tons—a decrease as compared with the preceding week of 4472 tons, and as compared with the corresponding week of last year, of 3355tons. For the year to date, the total shipments have amounted to 4,837,154 tons—an increase on the corresponding period of last year of 176,743 tons.

Projected Extensions at the Ramsgate Gas-Works.—At a meeting of the Gas and Water Committee of the Ramsgate Corporation held on Thursday, it was resolved to recommend that permission should be asked of the Local Government Board to borrow £20,500 to extend the gas-works, the money to be employed as follows: Amount of capital overspent to March 31, 1897, £5922; cost of the proposed extensions, as per report of the Engineer (Mr. W. A. Valon, J.P.), including £12,000 for the erection of a new gasholder and tank, £14,070, less £1000 estimated for the resale of surplus land. The balance of the £20,500 is put down as additional capital required for new mains, services, and meters. At a meeting of the Town Council held afterwards, it was resolved to give effect to the Committee's recommendations.

Colney Hatch Gas Company.—At the half-yearly meeting of this Company on the 26th inst. the Directors will report an increase of £453 in the gas-rental for the six months ending June 30, notwithstanding a reduction of 2d. per 1000 cubic feet in the price of gas last year, bringing it down to 3s. 10d. The quantity of gas sold was 13 per cent. more than in the corresponding period of 1896. In contrast to most other gas companies, residuals yielded a slightly larger revenue in the past six months than in the first half of last year, but rather as the result of increased production and sale than of improved prices. The total revenue was £6627; the expenditure, £4730—leaving a balance of £1897. The amount available for distribution is £3368, and the Directors recommend dividends at the rates of 10, 7, and 5 per cent. per annum. After payment of these, there will be £1664 to be carried forward.

The Acetylene Light Syndicate have taken premises at Trowbridge for the manufacture of calcium carbide on the principle patented by Messrs. Hudson Maxim and W. H. Graham.

The Halifax Corporation Gas Committee have accepted the following tenders: One battery of scrubbers (including erection), £4948, Messrs. C. & W. Walker; timber filling for scrubbers, £3150, Mr. W. Spencer, of Elland; exhauster and engine, £648, Messrs. Waller and Co.

House's Cement and Anticrustator Company, Limited, of Liverpool, are introducing a new acid cement which is specially suitable for lining tanks for tar, benzene, &c., and also for other special purposes. It is claimed for this cement that it is not affected by any amount of heat up to 1200° Fahr., or by fresh or sea water, oils, sulphuric acid, tar or ammonia, or by atmospheric changes, and by adopting it the use of portland cement and iron borings is entirely superseded. Another speciality of the Company is an improved fire cement, which is a product for use where the effects of intense heat have to be combated in the construction and renovation of furnaces, retorts, ovens, and heat chambers of all kinds. It can be used for repairing retorts, either when cold or in use, and for preserving new retorts; while it is also suitable for fixing mouthpieces.

GWYNNE & BEALE'S

PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: "GWYNNEGRAM, LONDON." Telephone No. 65,095.

GWYNNE & CO.,

HYDRAULIC AND GAS ENGINEERS;

BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

Late ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON.

They have completed Exhausters to the extent of 32,000,000 cubic feet passed per hour which are giving unqualified satisfaction in work.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, PATENT RETORT-LIDS, STEAM-PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.

Their Exhausters can be made, when desired, on their New Patent Principle to pass Gas without the slightest oscillation or variation in pressure.

MANY SIZES OF EXHAUSTERS KEPT IN STOCK.

Exhausting Machinery at Fulham and Bromley Gas-Works, London—each set passing 400,000 cub. ft. per hour drawing 14 miles distant from Beckton.

Catalogues and Testimonials sent on application.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS, should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
JOHN WM. O'NEILL, Managing Director, Palmerston Buildings, Old Broad Street, London, E.C.

ANDREW STEPHENSON, AGENT. All communications *re* Oxide to be addressed to Palmerston Buildings.

WINKELMANN'S "VOLCANIC" CEMENT. Fire Resistance up to 4500° Fahr. In use in most Continental Gas-Works, and in more than 300 British Gas-Works.
ANDREW STEPHENSON,
182, GRESHAM HOUSE,
OLD BROAD STREET,
LONDON, E.C.
Telegrams: "Volcanism, London."

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS TAR wanted.
BROTHERTON AND CO., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPENT OXIDE wanted.
BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS. Correspondence invited.

TUBES for Gas, Steam, and Water (all Sizes), Welded or Riveted. TANKS, HYDRAULIC MAINS, RETORT-LIDS, &c.
JOHN SPENCER, Globe Tube Works, WEDNESBURY; and 14, Great St. Thomas Apostle, LONDON.

HUTCHINSON BROTHERS, Gas Engineers, &c., Falcon Works, Barnsley, Makers of Wet and Dry Gas-Meters, Brass-Work, and general Gas Apparatus, Lead Saturators, Tanks, &c., Tools, and Gas-Works Sundries. (See p. 409, last week's issue.)
Telegrams: "HUTCHINSON BROS., BARNSLEY."

TO GAS AND WATER OFFICIALS.

SPECIAL and Favourable Terms for CYCLES are offered. The very best "up-to-date" Cycle at a reasonable Cost. "Dunlop" Tyres, Weldless Tube throughout, "Westwood" Rims, "Brook's" Saddle, "Perry's" or "Renold's" Chain, &c. The whole combining to make as fine a Machine as is possible to be made. Satisfaction guaranteed. Send at once for Catalogue post free.
MELROSE CYCLE COMPANY, COVENTRY.

TRAVELLER, with good Connection among Gas Companies, is open to ENGAGEMENT, or would take MANAGEMENT and TRAVEL when required. Undeniable References.
Address No. 2886, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Advertiser (Age 20), who has just completed his Articles, seeks an appointment as ASSISTANT MANAGER in a Gas-Works. Good Draughtsman.
Address No. 2905, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ADVERTISER requires Situation in a Gas-Works. Good Draughtsman and Accountant. Used to control of Workmen. Age 37. First-class Testimonials. Moderate Salary. Would go abroad.
Address No. 2907, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SITUATION wanted by Man, Age 36, as MAIN and SERVICE LAYER or GENERAL FITTER, or as ENGINE-DRIVER in Gas or Water Works. Would not object to go abroad. Eight years' first-class References.
Apply to D., 24, Collage Street, SOUTHAMPTON.

SITUATION Wanted by an experienced Man—Main and Service Laying, Meter and Stove Fixing, General Fitting, Reading Meters, &c. Could take charge of small Works as Working Manager. First-class References.
Address No. 2904, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see Aug. 3, p. 250.]

SADLER & Co., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
Telegraphic Address: "Sadler, Middlesbrough."

NEW GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

ALEX. P. KER, C.E., Consulting Gas Engineer, Hunton Road, Gravelly Hill, Birmingham, 25 Years Assistant Engineer and Manager of Works to the Corporation of Birmingham and their predecessors, MAY BE CONSULTED on all matters connected with GAS ENGINEERING, including Valuations, Alterations, Additions and Extensions, &c. REPORTS upon EXISTING WORKS and IN PROGRESS. EXAMINATIONS OF GAS for ILLUMINATING POWER and IMPURITIES conducted. Plans, Specifications, and Estimates prepared.

ECONOMY IN PURIFICATION.

INCREASE the Efficiency of your PURIFIERS by adopting CRIPPS'S PATENT BYE-PASS VALVE in the lower Tiers of Sieves. Practical Experience proves their Economy. Engineers are repeating orders after thorough trial.
References and Particulars can be obtained from the Makers—
C. & W. WALKER, Midland Iron-Works, Donnington, near Newport, SALOP.
And J. EVERY & SON, Phœnix Iron-Works. LEWES.

STOKER wanted.
For particulars, apply to the MANAGER, Gas-Works, Halesowen, near BIRMINGHAM.

WANTED, a thoroughly efficient and experienced FOREMAN MAINLAYER.
Apply, stating Wages required, Age, and Experience, to W. A. PADFIELD, Gas Offices, EXETER.

A WELL-KNOWN firm of Gas-Stove Manufacturers require an Experienced MANAGER. Good opening for a thoroughly competent man.
Apply by letter, to No. 2906, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

STOKER Wanted. Must be a good Shovel Charger, and used to Engine and Exhauster. Wages 24s. per week. Constant job to a steady Man.
Apply for further Particulars, to C. JEFFERY, Manager, &c., Gas-Works, Portland, DORSET.

WANTED, two Stokers, in small Works for Day and Night Shifts (Shovel Charging). Wages 18s. per week, with House, Garden, Coal, and Gas.
Apply, by letter, to No. 2897, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOREMAN MAIN LAYER AND OUTDOOR SUPERINTENDENT.

WANTED, for a Gas Company sup- plying annually 1200 million cubic feet, a person to act as FOREMAN MAIN LAYER and OUTDOOR SUPERINTENDENT. Must have a general knowledge of Main Laying and Distribution, also of Meters, Meter Fitting, &c.
Applications, stating Salary, &c., and endorsed "Application for Foreman Main Layer and Outdoor Superintendent," to be sent, on or before the 6th prox., to No. 2903, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special Attention to Repairs.
Before placing Orders, please write for Estimate.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E. and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

SULPHATE OF AMMONIA SATURATORS.

WALTER THOMASON and SONS, Chemical Plumbers, &c., and Makers of Lead Saturators, &c., 21, WESTON STREET, BOLTON. Repairs of every description.
Please write for Estimate before ordering elsewhere.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, } SCOTLAND.
NEWTON GRANGE, NEWBATTLE, DALKEITH, }

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD

IMPORTANT TO GAS ENGINEERS AND MANAGERS.

YOUR old Retorts made as good as new by Repairing them with CROWTHER'S STICK-FAST FIRE CEMENT. Can be used in Hot or Cold Retorts. Unequalled for the Repair of Inclined Retorts. Satisfaction Guaranteed.
Write CROWTHER, Practical Retort Setter, Manor Street, HUDDERSFIELD.

WANTED, at a Gas-Works in York- shire, with a make of 160 millions, a thoroughly competent WORKS SUPERINTENDENT. Must be capable of taking entire charge of Works, and understand every detail in the Manufacture and Distribution of Gas. Must also have had practical experience in the use of Oxide for Purification. House, Coal, and Gas free.
Applications, stating Salary required, and accompanied by *copies* of not more than three recent Testimonials, to be addressed not later than Aug. 30, 1897, to No. 2902, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Aberavon Corporation require a MANAGER for their Gas-Works, who thoroughly understands the Manufacture and Distribution of Gas. Annual make, about 18 millions. Salary £2 2s. per week, with House, Coal, and Gas. None but good Carbonizers need apply.
Applications, stating Age and Experience, and accompanied by *copies* of not more than three recent Testimonials, sealed, and endorsed "Manager," must be sent to the undersigned on or before the 30th of August inst.
By order,
M. TENNANT,
Town Clerk.
Aberavon, Aug. 17, 1897.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

FOR SALE—One 200-Light Gas-Meter Four Cast-Iron Purifiers, Condensing Pipes, &c.
Apply to GROUT AND CO., LIMITED, Silk Crape Works GREAT YARMOUTH.

FOR SALE—A Station Meter complete, in thorough working order. Recently overhauled and certified correct by Messrs. Braddock. Capacity, 50,000 feet per hour.
Apply to JOHN H. DARBY, Brymbo, near WREXHAM.

GAS-PUMP for Sale, horizontal, one Steam Cylinder, 18-inch bore, and two Gas Cylinders, 17½-inch bore, all 24-inch Stroke, on massive Bed-Plate, with heavy Fly-Wheels. Very strong. First-Class Make. Not much used.

Apply, by letter, to No. 2878, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also COMPLETE WORKS equal to 7000, 20,000, 60,000 cubic feet per diem. **Inquire and compare Prices and Particulars before ordering elsewhere.**

J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

RADCLIFFE AND PILKINGTON GAS COMPANY.

TO TAR DISTILLERS.

THE Directors of this Company invite TENDERS for the purchase of 920 Tons of the surplus TAR to be produced at their Works in Radcliffe during the Twelve Months commencing the 1st day of October next.

Particulars may be obtained from the undersigned, to whom endorsed tenders must be delivered not later than Tuesday, the 31st inst.

JAS. BRADDOCK,
Manager and Secretary.

Gas-Works, Radcliffe,
Aug. 18, 1897.

KNARESBOROUGH URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply of about 1500 Tons of GAS COAL for delivery during the Twelve Months following Sept. 1, 1897.

They also invite TENDERS for the purchase of the surplus TAR and AMMONIA WATER during the same period.

The Council reserve the right to divide the contract, and do not pledge themselves to accept the lowest or any tender.

Endorsed tenders to be sent to me not later than the 30th inst.

THOS. MAINMAN,
Clerk.

NORTHAMPTON GASLIGHT COMPANY.

TENDERS FOR TAR.

THE Directors are prepared to receive TENDERS for the purchase and removal of the surplus TAR produced at their Works, for a term of One or Two Years.

Quantity produced, about 2800 Tons per annum.

Particulars may be had on application.

The Tar will be loaded into Boats or into Railway Tank Waggons on the L. & N.W. Railway.

The Directors do not bind themselves to accept any tender.

Tenders, marked "Tender for Tar," to be delivered at the Company's Office on or before Tuesday, Sept. 14, 1897.

JOHN EUNSON,
Engineer.

s-Works, Northampton,
August, 1897.

CORPORATION OF LEICESTER.

SULPHURIC ACID.

THE Gas and Electric Lighting Com- mittee of the above Corporation are prepared to receive TENDERS for the supply of SULPHURIC ACID, made either from native Sicilian Brimstone, or recovered Sulphur, or Pyrites. Specific gravity in each case to be stated.

The Price to include free delivery by Rail into elevated Tanks, 27 feet high, at the Chemical Works, Aylestone Road.

Probable quantity, about 1700 Tons, to be delivered as required during the ensuing Twelve Months.

Tenders, addressed to Alderman Lennard, Chairman, and endorsed "Tender for Acid," to be delivered at these Offices not later than Eleven o'clock a.m., on Saturday, Sept. 11.

The Committee do not bind themselves to accept the lowest or any tender.

ALFRED COLSON, M.Inst.C.E.,
Engineer and Manager.

Offices: Millstone Lane,
Leicester, Aug. 20, 1897.

BOROUGH OF BEVERLEY.

TENDERS FOR COAL.

THE Gas Committee are desirous to receive TENDERS for the supply of COAL for a period of Twelve Months from the 1st of October next, to be delivered, as from time to time directed, by, and at the expense of, the Contractors f.o.b. at Keadby, or at the Pits, or at the Railway Station, Beverley, according to the terms of Contract.

The Coal to be of the best kind, well screened, free from Sulphur, Bats, Bind, Refuse and Dirt, and to be weighed (21 cwt. to the ton) upon the Corporation Machine.

Payments will be made monthly so long as the contract shall be duly fulfilled.

The Corporation do not bind themselves to accept the lowest or any tender.

Further Information may be obtained of the Gas Manager, Mr. James Gibson, at the Gas-Works, Beverley; and tenders, endorsed "Tender for Coal," must be delivered at my Office not later than Tuesday, the 31st of August, 1897.

By order,
J. WILLIS MILLS,
Town Clerk.

Guildhall, Beverley,
Aug. 14, 1897.

STOCKTON-ON-TEES CORPORATION.

TENDERS FOR GAS COAL.

THE Gas Committee of the above Cor- poration invite TENDERS for the supply in whole or in part of 35,000 Tons of GAS COAL for the Year ending Sept. 30, 1898.

Particulars and Form of Tender can be obtained on application to the undersigned at the Gas-Works.

Tenders, sealed and endorsed "Tender for Gas Coal," to be sent in not later than noon of the 26th day of August, 1897, addressed to M. B. Dodds, Esq., Town Clerk, Stockton-on-Tees.

The Gas Committee do not bind themselves to accept the lowest or any tender.

WILLIAM FORD,
Engineer and Manager.

Gas-Works, Stockton-on-Tees,
Aug. 3, 1897.

SHEFFIELD UNITED GASLIGHT COMPANY.

TO BOILER MAKERS.

THE Directors of this Company invite TENDERS for the construction and delivery to their Grimesthorpe Station of one LANCASHIRE STEAM-BOILER, 30 ft. long, by 7 ft. 6 in. diameter.

Copy of the Drawing and Specification, with Form of Tender, may be obtained upon application to the Engineer, Mr. Fletcher W. Stevenson, on payment of 10s. 6d. (not returnable).

Sealed tenders, endorsed "Tender for Boiler," must be delivered to the undersigned by post at the Company's Offices not later than the first post on Saturday, the 4th day of September next.

The Directors do not bind themselves to accept the lowest or any tender.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street, Sheffield,
Aug. 14, 1897.

SHEFFIELD UNITED GASLIGHT COMPANY.

FIRE-CLAY GOODS.

THE Directors of this Company invite TENDERS for the supply of FIRE-CLAY GOODS required for the construction of Fifteen REGENERATIVE RETORT-SETTINGS at their Grimesthorpe Station.

Specification and Form of Tender may be had on application to the Company's Engineer, Mr. Fletcher W. Stevenson.

Sealed tenders, endorsed "Fire-Clay Goods," must be delivered by post to the undersigned at the Company's Offices not later than the first post on Saturday, the 4th day of September next.

The Directors do not bind themselves to accept the lowest or any tender.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street, Sheffield,
Aug. 14, 1897.

SHEFFIELD UNITED GASLIGHT COMPANY.

TO IRONFOUNDERS, &c.

THE Directors of this Company invite TENDERS for the following for their Grimesthorpe Station:—

CONTRACT No. 46—The supply and erection of a CAST-IRON VERTICAL PIPE CONDENSER. The Condenser to consist of 250 Pipes, 18-inches diameter, with Arch Pipes, Bottom Boxes, Girders, and Connections complete.

CONTRACT No. 47—The supply and erection of CAST-IRON STANDARDS, GIRDERS, and PLATES to form a Stage-Floor, for the Retort-House. The House is 360 feet long, by 70 feet wide.

Drawings may be seen, and Specifications, with Bills of Quantities and Forms of Tender, obtained, on application to the Engineer, Mr. Fletcher W. Stevenson, on payment of 10s. 6d. each contract, which will be returned on receipt of a *bond-fide* tender.

Sealed tenders, endorsed as above, must be delivered not later than the first post on Saturday, the 4th day of September next, to the undersigned at the Company's Offices.

The Directors do not bind themselves to accept the lowest or any tender.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street, Sheffield,
Aug. 14, 1897.

SHEFFIELD UNITED GASLIGHT COMPANY.

TO ENGINEERS, IRONFOUNDERS, AND STEEL PIPE MAKERS.

THE Directors of this Company invite TENDERS for the following for their Grimesthorpe Station:—

CONTRACT No. 48—The supply and erection of STEEL PIPES to form Foul-Gas Mains. The Contract includes about 820 feet of 36-inch diameter Pipes and 860 feet of 30-inch diameter Pipes.

CONTRACT No. 49—The supply and delivery of 30 FURNACE DOORS, ASH-PANS, and SUNDRY CASTINGS.

Copies of Drawings and Specifications, with Forms of Tender, may be obtained on application to the Engineer, Mr. Fletcher W. Stevenson, on payment of 10s. 6d. each contract (not returnable).

Sealed tenders, endorsed as above, must be delivered not later than the first post on Saturday, the 4th day of September next, to the undersigned at the Company's Offices.

The Directors do not bind themselves to accept the lowest or any tender.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street, Sheffield,
Aug. 14, 1897.

BOROUGH OF WIDNES.

THE Corporation invite Tenders for the purchase of from 900 to 1000 Tons of GAS TAR from their Gas-Works for Twelve Months ending the 30th of September, 1898.

Forms of Tender and Conditions of Contract may be obtained from Mr. Isaac Carr, Assoc.M.Inst.C.E., Gas-Works, Widnes.

Tenders, endorsed "Tar," to be delivered to the undersigned not later than the 6th of September prox.

The Corporation do not bind themselves to accept the highest or any tender.

H. S. OPPENHEIM,
Town Clerk.

Town Hall, Widnes,
Aug. 13, 1897.

BARNOLDSWICK URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE Council are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIA WATER made at their Works for the Year ending Sept. 1, 1898.

Tenders to state Price per Ton for Tar and for Ammonia Water of from 4° to 8° Twaddell at Barnoldswick Station (Midland Railway).

The annual quantity produced is about 100 Tons of Tar, and 230 Tons of Ammonia Water.

Tenders to be sent in to the undersigned not later than Sept. 1 next, endorsed "Tender for Tar."

The highest or any tender not necessarily accepted.

D. E. GARLICK,
Manager.

Gas Offices, Barnoldswick,
viâ Colne.

ISLE OF THANET GAS COMPANY, MARGATE.

TO RETORT & FIRE-BRICK MANUFACTURERS.

THE Directors of the above Company are prepared to receive TENDERS for RETORTS, FIRE-BRICKS, and FIRE-CLAY required at their Works at Margate.

For Schedule of Quantities and other Particulars, apply to the Engineer and Manager, Mr. H. H. Jones.

Tenders, endorsed "Tender for Fire-Goods," and addressed to the Chairman of the Company, to be delivered here not later than Thursday, the 2nd of September, 1897.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
T. C. FULLER,
Secretary.

Gas-Works, Margate,
Aug. 20, 1897.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the ANNUAL ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at the Offices, Willoughby Lane, Tottenham, on Saturday, the 28th day of August inst., at half-past Three o'clock in the Afternoon precisely, to receive the Report of the Directors and the Statement of Accounts for the Half Year ended the 30th day of June, 1897, to declare a Dividend for the same period, and for the Election of two Directors and an Auditor for the ensuing Year, and for transacting the General Business.

The TRANSFER BOOKS WILL BE CLOSED for CONSOLIDATED STOCKS from the 13th to the 30th of August inst., both days inclusive.

By order,
JAMES RANDALL, Secretary.

Offices of the Company:
Willoughby Lane, Tottenham,
Aug. 6, 1897.

BRIGHTON AND HOVE GENERAL GAS COMPANY.

TO THE PROPRIETORS.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, No. 5, Great Winchester Street, London, on Friday, the 10th of September, 1897, at Two o'clock in the Afternoon precisely, to receive the Report of the Directors and the Accounts of the Company for the Half Year ended June 30, 1897, to declare Dividends, to elect Auditors, and for other purposes.

The TRANSFER BOOKS of the Company WILL BE CLOSED from the 28th of August, to the 10th of September, both days inclusive.

By order,
ERNEST L. BURTON,
Secretary.

5, Great Winchester Street, E.C.,
Aug. 23, 1897.

SOUTH METROPOLITAN GAS COMPANY.

SALE BY TENDER OF £43,333 6s. 8d. THREE PER CENT. PERPETUAL DEBENTURE STOCK.

MINIMUM PRICE, £105 PER CENT.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER £43,333 6s. 8d. of THREE PER CENT. PERPETUAL DEBENTURE STOCK, in accordance with the Provisions of the South Metropolitan Gas Acts, 1882 and 1896.

Particulars of same, with Form of Tender, can be obtained at this Office on application to the undersigned; and tenders must be sent in on or before Tuesday, the 14th day of September, 1897.

The Stock will be allotted to the highest bidders; but no tender will be accepted at a lower price than at the rate of £105 money for each £100 Debenture Stock.

By order,
FRANK BUSH,
Secretary.

Offices: 709a, Old Kent Road, S.E.,
Aug. 18, 1897.

PUBLICATIONS

ISSUED BY

WALTER KING,

11, BOLT COURT, FLEET STREET, LONDON, E.C.

ALL PARCELS SENT CARRIAGE FREE.

THE FLOW OF GASES & PROPORTIONING GAS-MAINS. — FOUR DIAGRAMS (with explanatory pamphlet). Invented by F. SOUTHWELL CRIPPS, Assoc.M.Inst.C.E. Price 7/6, Demy 4to., Limp Cloth.

CONSPIRACY AND PROTECTION OF PROPERTY ACT.—It is required, under a Penalty of FIVE POUNDS, that a printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat. Printed copies of this section, in large type, on broad sheets, price 2/- per dozen, or 10/6 per 100. The Act extends to Scotland and Ireland.

TABLES OF VALUES, DISCOUNTS, DIVIDENDS, AND WEIGHTS AND MEASURES, FOR USE IN GAS OFFICES.—Arranged by THOMAS NEWBIGGING, M.Inst.C.E. Price 2/-.

ANALYSIS OF THE ACCOUNTS OF THE METROPOLITAN WATER COMPANIES.—Issued Annually, as compiled and arranged by ALFRED LASS, F.C.A. Sixteenth year, 1895-96, price 15/-. Previous Volumes still on sale.

GASHOLDERS WITH OR WITHOUT GUIDE-FRAMING.—A Discussion between E. Lloyd Pease and F. Southwell Cripps. To which is added a Synopsis of all the Literature (English and Foreign) on Reducing or Abolishing the Guide-Framing of Gasholders, also the principal Literature on Gasholder Construction generally, compiled to March, 1893; with a List of all the English and Foreign Periodicals connected with the Gas Industry.—By F. SOUTHWELL CRIPPS, Assoc.M.Inst.C.E. In Paper Covers. Price 1/-.

ORDERS FOR OTHER TECHNICAL PUBLICATIONS WILL BE EXECUTED AT PUBLISHERS' PRICES.

ISSUE OF STOCKS AND SHARES BY AUCTION UNDER PARLIAMENTARY POWERS.

MR. ALFRED RICHARDS undertakes the issuing by Auction of GAS AND WATER SHARES under Parliamentary Power.

He also holds MONTHLY SALES of GAS AND WATER SHARES at the Auction Mart, Tokenhouse Yard, E.C.

Terms for the issuing of Capital, and also for offering to auction Gas and Water Shares, and all Particulars relating thereto, may be had of Mr. Alfred Richards.

Offices: 18, FINSBURY CIRCUS, E.C.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on Application.

Lanemark Coal Co.,

LIMITED.

LANEMARK CANNEL AND GAS COALS.

Quotations and Analysis on Application to

LANEMARK COLLIERY,

NEW CUMNOCK, N.B.

Shipping Ports: All the principal Scotch Ports.

HOLMSIDE GAS COALS.

PRESENT DAILY PRODUCE OVER 4000 TONS.

LATEST ANALYSIS—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation.

Yield of Gas Per Ton. . 11,205 Cubic Feet.
Illuminating Power, $16\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality) $13\frac{3}{4}$ Cwt. Per Ton.
Sulphur . . . . A little over 1 Per Cent.
Ash . . . . . Under 1 Per Cent.
Tar . . . . . 163 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 103 Lbs. (Avoir.) Per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.

PRESENT DAILY PRODUCE AVAILABLE 2500 TONS.

RESULTS OF DIFFERENT ANALYSES:—

Yield of Gas Per Ton. . 10,500 Cubic Feet.
Illuminating Power . 17 Stand. Sperm Candl.
Coke (of excellent quality) . $13\frac{1}{2}$ Cwt. Per Ton.
Sulphur . . . . . 1·13 Per Cent.
Ash. . . . . 1·34 Per Cent.
Tar. . . . . 180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor $94\frac{1}{2}$ Lbs. (Avoir.) Per Ton.

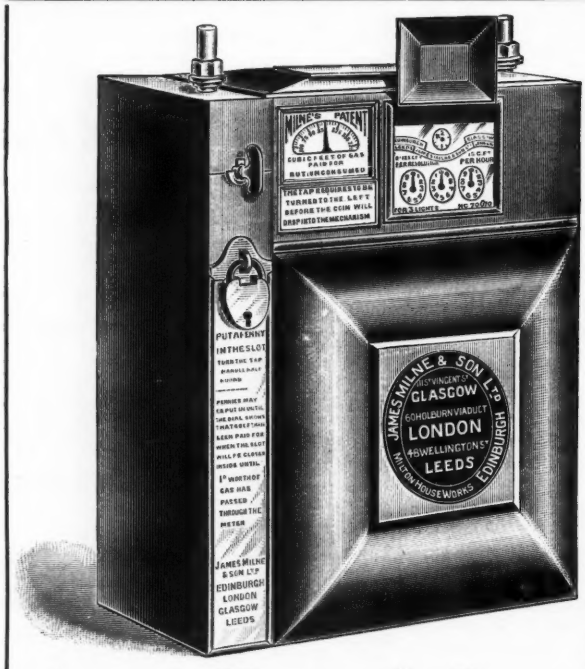
The HOLMSIDE and SOUTH MOOR COAL-FIELD possesses *a very great quantity of the best Coal;* and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,

HOLMSIDE AND SOUTH MOOR OFFICES,

NEWCASTLE-UPON-TYNE.



JAMES MILNE & SON, LTD.,

MILTON HOUSE WORKS

EDINBURGH.

LONDON. GLASGOW. LEEDS.

MILNE'S PATENT PREPAYMENT DRY METER.

MOST compact Attachment in the Market.

Same Height as an Ordinary Meter.

Cast-Iron Attachment Cover, with extra large Money-Box, which is withdrawn while opening Door.

Absolutely Positive in Action.

The Whole Mechanism always in Gear.

The following unsolicited comparison has been sent us as showing the exact correspondence of amount due per Index and Cash in Money-Box with these Meters as against those of other Makers:—

Milne's Meter	due per Index	3/4	Cash in Box	3/4
Milne's	,,	,,	4/2	,,	4/2
Milne's	,,	,,	2/6	,,	2/6
Milne's	,,	,,	3/4	,,	3/4
Milne's	,,	,,	2/6	,,	2/6
Two other Makers.	,,	,,	6/8	,,	6/11
	,,	,,	1/8	,,	2/0
	,,	,,	3/9	,,	5/2
	,,	,,	2/6	,,	2/8
	,,	,,	4/7	,,	6/0

TROTTER, HAINES, & CORBETT,

Brettell's Estate

FIRE-CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAY.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 34, OLD BROAD ST., E.C.

Telephone: Castleford No. 214. | Postal Address: Castleford.
Telegrams: "Silkstone Castleford."

THE SILKSTONE & HAIGH MOOR COLLIERIES, LTD.

ALLERTON BYWATER, CASTLEFORD.

Steam, Manufacturing, & Gas Coals & Cannel

Analysis, Contracts, Trial Waggons, and Quotations for Large and Small Orders. Inquiries Solicited.

HEATHCOTE GAS COAL.

Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.,

CHESTERFIELD.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,

SEAHAM HARBOUR, COUNTY OF DURHAM.

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, near SHEFFIELD,

MANUFACTURE

SILICA BLOCKS, BRICKS, AND CEMENT

OF SUPERIOR QUALITY

FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY,

Strongly recommended where EXCESSIVE HEATS have to be maintained.

THE STAFFORDSHIRE TUBE Co.

TELEGRAMS:
"EVESON, BIRMINGHAM."

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.
8 Lombard Street,
NEWCASTLE-ON-TYNE.

W. RICHARDSON, Fitter.

COKE-BREAKERS,

PRICES REDUCED.

(THOMAS & SOMERVILLE'S PATENT)

New Design, with two Cutting Rollers, making less Breeze than their old pattern.

GEORGE WALLER & CO.,
165, QUEEN VICTORIA STREET, E.C.,
And at STROUD, GLOUCESTERSHIRE.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

JAMES OAKES & Co.,

ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co., LD.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by
Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton . .	10,500 Cub. Ft.
Illuminating Power . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
Sulphur	0·58 „
Ash	2·73 „

For Price, &c., apply to the

WEARDALE IRON & COAL Co., LD.

QUAYSIDE, NEWCASTLE-ON-TYNE.

E. ASQUITH & CO.,

Hydraulic Engineers,
17, Mather Street, Ancoats, Manchester,
Fit up Plants for

Pressing Anthracene, Naphthalene, &c.

Competent Men sent out to erect same. Estimates given.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per ton . .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to

W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON NEWCASTLE."

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY

FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.

LONDON OFFICE:
90, CANNON STREET, E.C.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887,

for

CANNEL & COAL.

TYNE

BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,
21, JOHN STREET ADELPHI, LONDON, W.C.

JOHN BROWN & CO., LTD., SHEFFIELD.

Proprietors of

ALDWARKE MAIN, CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 Feet of 19-Candle Gas per Ton.

Value in Pounds of Sperm, 820·80.

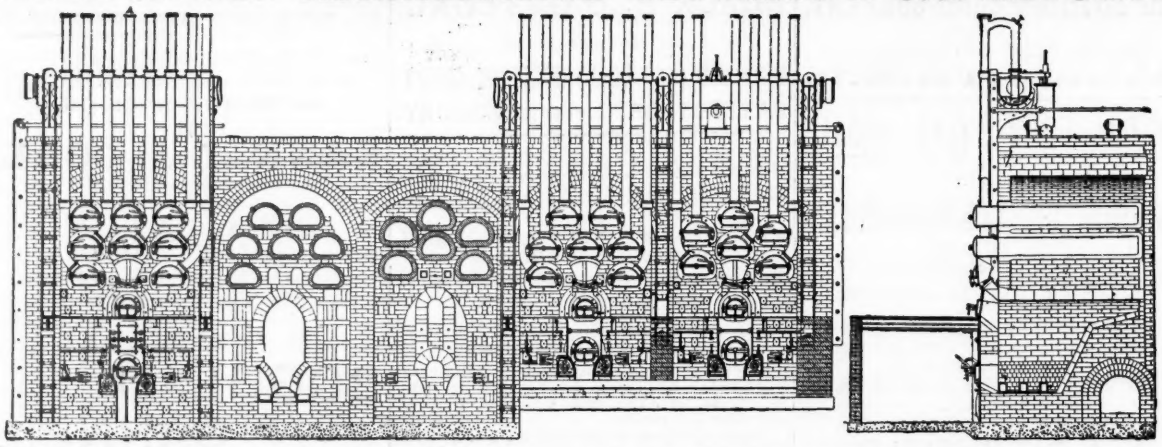
VERY FREE FROM IMPURITIES.

TELEGRAMS: "ATLAS, SHEFFIELD."

W. J. JENKINS & CO., RETFORD.

COAL UNLOADING AND CONVEYING MACHINERY.

HISLOP'S PATENT REGENERATIVE SETTINGS OF GAS-RETORTS.



THESE SETTINGS ARE POSITIVELY UNRIVALLED IN PRODUCTIVE CAPACITY, DURABILITY, AND SIMPLICITY OF MANAGEMENT. RETORTS OF ORDINARY DIMENSIONS CARBONIZING FROM 17 TO 20 CWT. OF ENGLISH AND 20 TO 24 CWT. OF SCOTCH COAL PER 24 HOURS, DEPENDING UPON THE NATURE OF THE COAL, AND PRODUCING UP TO FULLY 13,000 CUBIC FEET PER MOUTHPIECE IN THE SAME TIME, AND WITH THE SMALLEST EXPENDITURE OF FUEL ATTAINABLE, AND RETURNING IN PROFIT THE ENTIRE COST OF ERECTION WITHIN TWELVE TO EIGHTEEN MONTHS; AND THUS REDUCING TO INSIGNIFICANCE THE INCREASED COST OF THESE SETTINGS OVER THE COMMON OR GENERATOR FURNACE SYSTEMS.

THESE SETTINGS ARE EXTENSIVELY ADOPTED, AND ARE ERECTED UPON THE SHALLOW AND STAGE FLOOR PLANS. THEY ARE ADAPTED TO ANY EXISTING ARRANGEMENTS, AND PERFECT SATISFACTION GUARANTEED. THE COMPOSITION OF FIRE-RESISTING AND OTHER SPECIAL FIRE-CLAY MATERIALS FURNISHED IS OF THE HIGHEST ORDER; AND THE SYSTEM AS A WHOLE, AS NOW PERFECTED, IS THE RESULT OF LONG EXPERIENCE AND CAREFUL STUDY OF THE PRINCIPLES OF GASEOUS FIRING.

Drawings and Tenders are furnished for the complete erection of Benches, including Retort and Bench Mounting of the most modern and approved description; or existing Ovens fitted up with the Patentee's arrangements.

Agents: **Messrs. JONAS DRAKE AND SON**, Retort Setters and General Carbonizing Engineers, Ovenden, Halifax, Yorkshire, Sole Agents for England, Wales, and Foreign Countries; **C. M. HAMILTON**, Retort Setter and Contractor, Hamilton, Agent for Scotland and Ireland; Principal Agent, **R. F. HISLOP** (Son of Patentee), General Constructing and Carbonizing Engineer, Gas-Works, Paisley, N.B., and to whom all Inquiries should be addressed in the first instance.

HISLOP'S PATENT HYDRAULIC MAIN SEAL-REGULATING AND TAR-EXTRACTING VALVE is a *Sine qua non*

TO THE SATISFACTORY WORKING OF THE HYDRAULIC MAIN UNDER THE REGENERATIVE AS WELL AS OTHER SYSTEMS OF RETORTS. BEING LARGELY ADOPTED AND AFFORDING THE HIGHEST SATISFACTION.

The Patentee's SELF-SEALING CAPS FOR THE TOP OF ASCENSION-PIPES, and his "SPECIAL" FLUE PORT BOXES, are most important additions to his Carbonizing Plant.

SPENT LIMES NO LONGER WASTE PRODUCTS.

Under G. R. HISLOP'S Patents, all Spent Limes are effectively recovered at from one-third to one-half the cost of New Lime.

Further Information and Pamphlets from Principal Agent.

THE

DENAYROUZE LIGHT SYNDICATE, LTD.,

BEG to announce that, having made arrangements for the Manufacture of their **BURNERS** in England, they are **NOW ABLE TO SUPPLY THESE IN ANY QUANTITY.**

These Burners (with Mantles specially made for the Syndicate by the Incandescent Gas-Light Company, Ltd., under the Welsbach Patents) are admitted by all Experts to be the **BEST AND MOST ECONOMICAL LIGHTS FOR LARGE AREAS AND PUBLIC STREETS.**

Press Notices and Opinions from all the leading Gas Managers throughout the Kingdom can be seen on applying to

CHARLES EDWARD MASTERMAN,
GENERAL MANAGER.

28, VICTORIA STREET, LONDON, S.W.

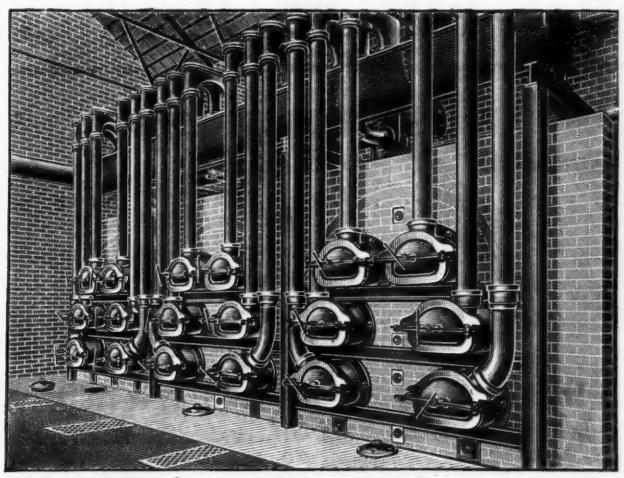
R. DEMPSTER & SONS,
LIMITED.

ELLAND, YORKS.

GENERATOR AND REGENERATOR FURNACES AND SETTINGS

OF EVERY DESCRIPTION suitable for LARGE OR SMALL GAS-WORKS.

Retort-Houses with Complete Installations, both Horizontal and Inclined Regenerator Settings.



Coal and Coke Crushing, Elevating, and Conveying Plant, all on the latest approved Designs.

REFERENCE TO ENGINEERS WHERE RETORTS ARE IN OPERATION.

PLANS AND ESTIMATES ON APPLICATION.

Telegrams—"DEMPSTER, ELLAND." NATIONAL TELEPHONE, 1408 ELLAND.

Price 7s. 6d. per 100; £3 *per* 1000 (*Carriage Free*), *Demy* 4*to.*,

A LEAFLET ON

SULPHATE OF AMMONIA:

ITS SOURCE—RELATIONSHIP TO SOIL—EFFECT ON PLANTS.

BY

H. H. COUSINS, M.A., South-Eastern Agricultural College, Wye.

London: WALTER KING, 11, Bolt Court, Fleet St., E.C.

BOWENS' Ltd. Successors,

STOURBRIDGE.

MANUFACTURERS OF

BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.

Established 1860.

HARRIS & PEARSON,

STOURBRIDGE, ENGLAND,

MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.

GLAZED BRICKS AND PORCELAIN BATHS.

Wrought-Iron

And Fittings and Accessories.

LAMBERT BROS., WALSALL,

MANUFACTURERS OF

WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM.

BRASS GAS-FITTINGS, GAS-VALVES, STEAM & WATER VALVES, TOOLS, &c., AND OF WARNER'S PATENT MARKET GAS STAND-PIPE.

LONDON: LAMBETH BRASS & IRON CO., Ltd., Short St., LAMBETH.

LONDON OFFICE

60, QUEEN VICTORIA ST. E.C.

TELEGRAPHIC ADDRESSES "DRAKESON HALIFAX." "ECLAIRAGE LONDON."

TELEPHONE No 43. "HALIFAX EXCHANGE"

GAS ENGINEERS. CONTRACTORS. IRONFOUNDERS.

RETORT SETTERS. FURNACE BUILDERS. ETC. ETC.

JONAS DRAKE & SON

SOLE AGENTS FOR

HISLOP'S

PATENT REGENERATIVE FURNACES

—FOR—

ENGLAND, WALES & ABROAD.

RETORT BENCHES ERECTED COMPLETE WITH OR WITHOUT SPECIAL FURNACES. RESULTS GUARANTEED.

OVENDEN HALIFAX

Designs and Estimates on Application.

GASEOUS FIRING A SPECIALTY.

MOBBERLEY & PERRY

STOURBRIDGE.

Manufacture & supply best quality of

Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)

Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.

FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c., &c.

EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.

Contractors for the erection of Retort-Benches complete.

London Agents:

BALE & HARDY,

Gas Engineers and Contractors,

BRIDGE HOUSE, 181, QUEEN VICTORIA STREET, E.C.

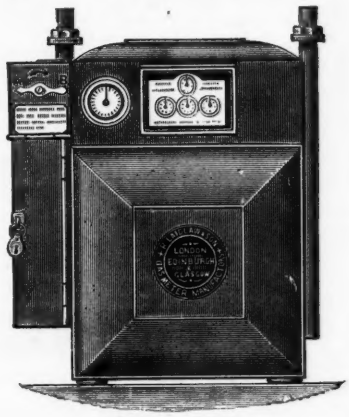
R. LAIDLAW & SON

GAS & WATER ENGINEERS.

MANUFACTURERS OF WET & DRY GAS-METERS,

SIEMENS WATER-METERS,

PREPAYMENT GAS-METERS.



—DRY METER.—

—WET METER.—

EDINBURGH: SIMON SQUARE WORKS. | **GLASGOW:** ALLIANCE FOUNDRY. | **LONDON:** 6, LITTLE BUSH LANE.

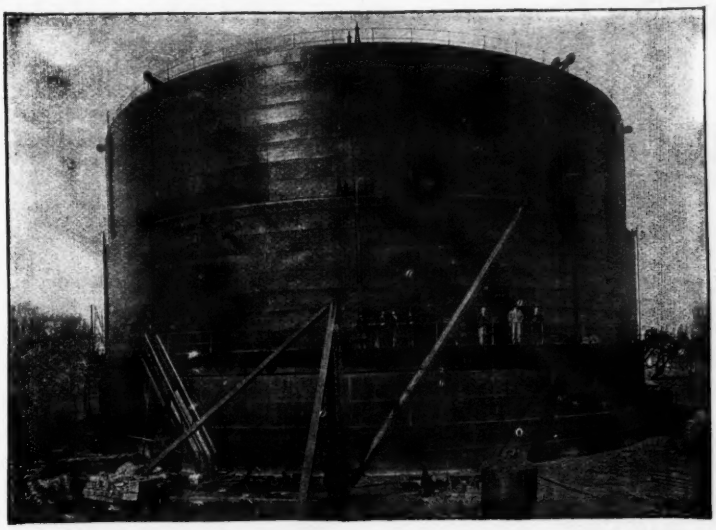
COLUMNLESS GASHOLDERS

ON PEASE'S STEEL CABLE SYSTEM.

Great Saving in Cost, and Absolutely Reliable in Working.

Patent Holders are working at—

MIDDLESBROUGH
SLIGO (Ireland)
MILAN (Italy)
ATHENS (Greece)
BREST (France)
CAPE TOWN
BATHURST (N.S.W.)
TYNE DOCK
NEWBURN-ON-TYNE
ST. AUSTELL
BIRKENHEAD
NOTTINGHAM (4)
MANCHESTER (4)
DARLINGTON
BARROW-IN-FURNESS
HASLINGDEN
SELBY
STONE
DERBY
BIRMINGHAM
PRESTON MILLS
FALKIRK (N.B.)
BARCELONA (Spain)
PERTH (W. Australia)
PERTH (N.B.)
And many other places.



TWO-LIFT GASHOLDER. Capacity, 560,000 cub. ft. Steel Tank, 126 ft. 6 in. dia.; 25 ft. deep.

— PERTH GAS-WORKS. —
(From a Photograph)

Orders now in hand for Patent Holders for—

WAR OFFICE, Woolwich
FALMOUTH
MALVERN
WALLASEY
OLDHAM
STOCKPORT
TRURO
VALPARAISO
BUCHAREST, Roumania
SVENDBORG, Denmark
BARKING
YSTAD, Sweden

These Holders are certified by users to be STEADIER UNDER WIND PRESSURE than Holders with Columns.

INSPECTION INVITED.

Freights Reduced in Shipping Orders.

Manufacturers and Patentees, Telegrams: "GASHOLDER."

ASHMORE, BENSON, PEASE, & CO., LIMITED,

STOCKTON-ON-TEES.

"RANGITOL"

READY MADE INCANDESCENT LIGHT PREPARATION,
Powder or Liquid, of Best Quality, supplied Cheap by
DR. PHILIPP HIRSCH,
Manufacturer of Chemicals, PANKOW-BERLIN.
Nitrate of Thorium, Chemically Pure, at lowest Prices.
SAMPLES FREE ON APPLICATION.

PETTIGREW'S PATENT

Sulphate of Ammonia Plant

ON THE CONTINUOUS SYSTEM

Is the newest in the Market, and is the outcome of practical experience in Sulphate Making.

Old Systems easily and cheaply converted.

ANY SIZE ERECTED COMPLETE AT HOME OR ABROAD.

Write for Particulars, Testimonials, and References to

GEO. PETTIGREW & Co.,

GAS AND CHEMICAL ENGINEERS,
MIDDLESBROUGH-ON-TEES.

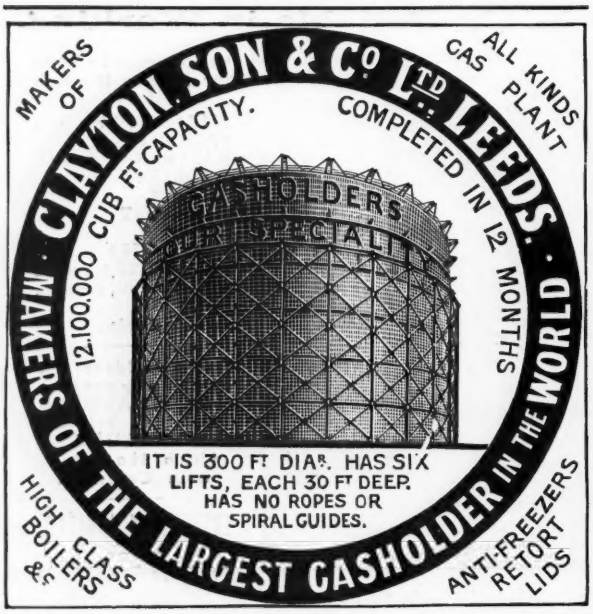
ARROL-FOULIS

Patent Automatic Machinery
FOR
DRAWING AND CHARGING GAS-RETORTS.

Full Particulars may be obtained from the Sole Makers,

SIR WILLIAM ARROL & CO., Limited,
GLASGOW.

[See Illustrated Advertisement, Aug. 3, p. 295.]


MAKERS OF
CLAYTON, SON & Co LTD LEEDS
ALL KINDS GAS PLANT
12,100,000 CUB FT CAPACITY.
COMPLETED IN 12 MONTHS
GASHOLDERS
SPECIALITY
IT IS 300 FT DIAS. HAS SIX LIFTS, EACH 30 FT DEEP. HAS NO ROPES OR SPIRAL GUIDES.
MAKERS OF THE LARGEST GASHOLDER IN THE WORLD
HIGH CLASS BOILERS &c
ANTI-FREEZERS RETORT LIDS

GIRDERS, ROOFS, & ALL KINDS OF STRUCTURAL IRONWORK.

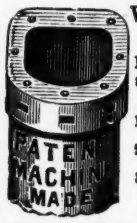
London Office: 60, QUEEN VICTORIA STREET, E.C.
Telegraphic Addresses: "GAS, LEEDS," "ECLARAGE, LONDON."

HARPER & MOORES,
STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS, GAS-RETORTS,
LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.
Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.
MANUFACTURERS OF GLASSHOUSE POTS AND CRUCIBLES OF EVERY KIND.
ESTABLISHED 1833.

WILLIAM INGHAM & SONS,

Incorporated with the Leeds Fire-Clay Company, Ltd.,



WORTLEY FIRE-CLAY WORKS,
Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT
MACHINE-MADE GAS-RETORTS.

The Climax of Regenerative Gas Lighting!!

THE
"VERTMARCHE"
A 280-Candle Power
PLAIN IRON LAMP,
CLASS A— **55/-**
LIGHT for LIGHT
less than half the price of any other Regenerative Lamp.
Manufactured in England.

HENRY GREENE & SONS,
153 & 155, CANNON STREET,
LONDON BRIDGE E.C.
PARTICULARS AND PRICES FREE. AGENTS WANTED.

PATENT TWISTED TAPER
RYMERS & TAPS.

These **Patent Twisted Taper Rymers and Taps** are the best ever made for Gas and Water Service Connections. A true Hole and a correct Thread can be assured. They are easy to work, and will last much longer than straight grooved Taps and Rymers.

THOUSANDS ARE IN DAILY USE.

Also SCREWING-MACHINES, STOCKS and DIES (with Patent Twisted Dies), PIPE-TONGS, and other TOOLS.

Apply for Prices and Particulars to

JOHN RUSCOE,
ALBION WORKS, HYDE, near MANCHESTER.

OXIDE OF IRON.

NATURAL BOG ORE FROM OWN MINES.

Samples and Prices on application.

WM. H. MÜLLER & CO.,

81, PALMERSTON BUILDINGS, LONDON, E.C.

TRADE MARK: "Compascum." Telegraphic Address: "FERRUM."

JOSEPH CLIFF & SONS,

INCORPORATED IN

THE LEEDS FIRE-CLAY COMPANY, Ltd.,

WORTLEY, LEEDS.

LONDON OFFICES & DEPÔTS:

Baltic Wharf, Waterloo Bridge.

WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.

LIVERPOOL:

16, Lightbody Street.

LEEDS:

Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

GODDARD, MASSEY, & WARNER'S

IMPROVED

Sulphate of Ammonia Apparatus.

The most successful and approved Apparatus known up to the present time.

FOR REFERENCES, PARTICULARS, TESTIMONIALS, AND PRICES APPLY TO

GODDARD, MASSEY, & WARNER,

ENGINEERS,

NOTTINGHAM.

The Apparatus has been supplied to the following Firms—

BURT BOULTON, & HAYWOOD, SILVERTOWN, and ELING.
CHANCE BROTHERS, OLDBURY (FOUR APPARATUS).
RUNCORN SOAP & ALKALI CO., Limited, RUNCORN.
NETHAM CHEMICAL CO., Limited, BRISTOL.
ANIMAL CHARCOAL CO., Limited SHADWELL.
WM. BUTLER & CO., BRISTOL.
KEMPSON & CO., Pye Bridge.

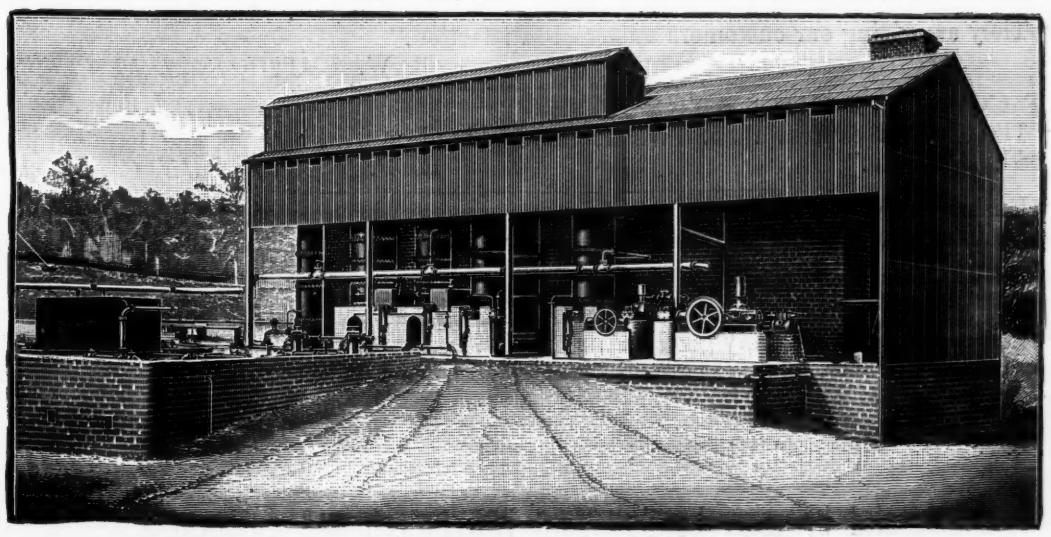
And to the following Gas Companies and Corporations—

ILKESTON.	BURY.	CHORLEY.
WIDNES.	BRIGHOUSE.	WHITEHAVEN.
HALIFAX.	MARKET HARBRO'	CHESTER.
ALTRINCHAM.	PRESCOT.	SOUTH SHIELDS.
DENTON.	SOWERBY BRIDGE.	LEEK.
ST. ALBANS.	LEICESTER.	IPSWICH.
DUKINFIELD.	DARWEN.	BOURNEMOUTH.
NORTHWICH.	NELSON.	SALFORD.
HUDDERSFIELD.	ORMSKIRK.	LUTON.
		HAMPTON COURT.

R. & J. DEMPSTER, LTD., GAS PLANT WORKS,

Telegraphic Address: "SCRUBBER, MANCHESTER." National Telephone Nos. 54 and 2296.

NEWTON HEATH, MANCHESTER.



From a Photograph.

LENNARD'S PATENT CONTINUOUS TAR-DISTILLING APPARATUS, as erected at various Works in England and Scotland.

Sole Makers: R. & J. DEMPSTER, Ltd.

THE "PARKINSON"

GOLD MEDAL

GAS COOKER.

SPECIAL FEATURES.

May now be had with either Cast or Wrought Iron Enamelled Linings, very easily cleaned, and practically indestructible. The "Parkinson" Cooker is now fitted with the registered Cast-Iron Hinged Gate—an invaluable contrivance for ensuring a clean, well-ventilated Oven.

WHAT GAS ENGINEERS SAY:—

"I have no sort of hesitation in testifying to the excellence and effectiveness of the Gas Cookers. Give no trouble, bake admirably, and cook to perfection."

JOHN L. COCKER, *Merthyr Tydvil Gas Company.*

"They are giving our customers universal satisfaction."

B. W. SMITH, *Smethwick Gas-Works.*

WHAT COOKERY TEACHERS SAY:—

"The teachers express themselves as thoroughly pleased with them, and have put them to very considerable tests."

R. P. WARD, *Cheshire County Council.*

"During last winter we used them at all the centres where we cooked by gas; and we shall continue to do so until we find they are superseded, which I consider unlikely."

MATILDA LEES DODS, Principal,
Birmingham and Midland School of Cookery.

"It is easy to manage, very good in its results, and most economical in the consumption of gas. Pastry, bread, cakes, and meat are all equally well cooked and beautifully browned in the oven. The grilling, boiling, and simmering arrangements are perfect."

I am, Gentlemen, yours faithfully,
(Signed) SOPHIE THWAITES, *International School of Cookery, Liverpool.*

Adopted by many LONDON AND PROVINCIAL GAS COMPANIES.

COTTAGE LANE WORKS, CITY ROAD,
LONDON.
Telegraphic Address: "INDEX."

BELL BARN ROAD WORKS,
BIRMINGHAM.
Telegraphic Address: "GAS-METERS."

[See also Advt. p. 424.

LONDON: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, Aug 24., 1897.